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THE FAIR FUND.

Here we are in mid-June, and the Fund for the proposed Gas Building at the World's Fair is not yet at the 50 per cent. point. During the week the total amount pledged was increased only in the insignificant sum of $872, which result is, to say the least, depressing and discouraging. The meager subscription list of the week, however, is not in any sense meager as to evidence of a most liberal spirit on the part of the subscribers. For instance, the Derby Company, of Birmingham, Conn., goes on the list to the full amount of the allotment proposed by the Council, and in addition thereto its Manager, Mr. Nettleton, adds a personal contribution of $200. Then, again, the Richmond (Ky.) Company, and also the Topeka (Kansas) and the Altoona (Pa.) Companies comply to the full with the terms of the subscription. The attitude of the Chicago Company is unexplainable and, beyond a doubt, has much to do with the coldness of many of the other large companies. Chicago whines out that it has subscribed $50,000 to the general Fair fund, and thinks that is enough—which it undoubtedly was, when it came solely to the question of helping to secure the Fair proper for the Windy City—as a wealthy and patriotic citizen of the city it could have not done less, and especially as a "citizen" who calculated pretty closely what the subsequent return to him, on account of increased gas sales, as the result of the holding of the Fair in Chicago, would mean to his treasury. We wonder if the gentlemen of the Chicago Company imagine the "rest" of the gas world is oblivious to the fact that that $50,000 subscription has a good, stout string, attached to its center. Do they not hope, when the World's Fair accounts are finally balanced, that they will get back *at least* fifty per cent. of their citizen-like offering in good, cold cash? There is no blinking the fact that the Chicago Company's check to the Council for a sum equal to the proportion named by the Council would complete the *fund* necessary for the purpose in hand—that of showing at its best estate the article that has enriched several of the gentlemen now in control of the Chicago Gas Company's business. New York is liberal enough in such matters, but neither the Consolidated nor the Mutual Company will contribute a cent unless the home Company does what it should do. Of course, the Equitable will do as the Chicago Company does—keep what it has got, and hope for more; while the Standard Company remains an unknown factor, with the likelihood that it will respond ultimately in a fraternal way. In the meantime would it not be wise to name the time at which the fund shall be closed, and then go ahead with a building such as might be completed out of the funds already pledged. If we cannot have the cake of union let us consume the bread of independence. A statement of the fund, as it stood on the evening of the 8th inst., is appended:

May	30.	Richmond Water and Lt. Co., Richmond, Ky....	$24 00
June	1.	Nebraska City Gas Co., Nebraska City, Neb.....	12 00
"	3.	Excelsior Coke and Gas Co., Topeka, Kas.....	132 00
"	4.	Globe Lt. and Heat Co., Chicago, Ills.....	100 00
"	4.	Penn Globe Gas Lt. Co., Philadelphia, Pa.....	100 00
"	6.	Altoona Gas Co., Altoona, Pa.....	248 00
			$616 00

Increased Subscriptions.

"	1.	Derby Gas Co., Birmingham, Conn.—This substituted for personal subscription of Chas. H. Nettleton, Birmingham, Conn., dated March 11, for $100, increased to $156.....Increase	56 00

Special Guarantee Fund.—Not available until regular subscription list proves insufficient.

June	1.	Charles H. Nettleton, Birmingham, Conn.....	200 00
		Total.....	$872 00
		Amount previously published.....	58,384 28
		Grand total (to June 6).....	$59,256 28

BRIEFLY TOLD.

MATTERS BEFORE THE MASSACHUSETTS STATE COMMISSION.—The Massachusetts Board of Gas and Electric Light Commissioners have many matters of moment before them. They have just handed in their report on the petition for a proposed opposition Gas Company, at New Bedford, and their findings, which we hope to give in full in the JOURNAL of next week, in the case make very interesting reading. The tone of the argument is admirably free from prejudice, and the conclusions are sure to meet the approval of every one who approaches the subject impartially. Other petitions now under consideration are those from Springfield, on the request from certain consumers for a reduction in the selling rates; likewise, from East Boston; again, from Boston proper—this petition is signed by over 100 proprietors of large business interests in the city, notable ones being J. R. Whipple & Co., of the Parker House and Young's Hotel; Tilly Haynes, of the United States Hotel; the great drygoods house of Jordan, Marsh & Co., and others of a similar class; and a petition asking for an examination of the conditions under which the electric lighting supply of Worcester is being carried on. Take it all in all, the Commissioners have their hands full.

MENTIONING the Springfield case causes us to say that, because of a request that ought in all fairness to be honored, we defer our promised review of the hearing until the evidence is all in.

ANOTHER thing that our reference to the Commission brings to mind is the fact that Commissioner Barker's term of office is about to expire. We believe his political faith differs from that of Governor Russell, in whom the appointing power is vested, but we sincerely hope that the Governor will listen only to justice in making this appointment. Mr. Barker is the technical member of the Commission, and if a splendid record in the service is to count in the balance, the Governor, whose wise choices so far have actually commended him even to his political opponents, will do more for the promotion and general establishment of gas commissions in the country by re-appointing Mr. Barker, than he could achieve by any other single action. The gas men of the United States have watched Mr. Barker's course closely, and they would, no matter to what political faith they subscribe, hail his re-appointment with exceeding satisfaction. Such a course would at once disarm the opponents of State Gas Commissions of one of their mainstays in dissent—that the appointing power would be influenced by political favoritism in selecting the commissioners, wherefore the gas interests would still be subjected to whim and caprice rather than be held in check by men of singleness of purpose, who while respecting the wishes of the consumers would not be prejudiced to the rights of the manufacturers.

MR. HIGGINS seems to have had the better of that argument, about the relative value of crude oil and naphtha, at the Detroit meeting. Who for instance would claim that Glace Bay gas coal, at $3 per ton, was the equal of standard American gas coal at $3.50 per ton? Just ask the coal gas makers of this section that question, particularly those who were affected by the recent strike of the coal miners.

The Market for Gas Securities.

Consolidated gas shows no change. It is steady at 114¼ to 114¾. Other city shares remain as when last quoted. The East River speculation rides easily on the ebb and flow of the tides that lave the mud of Hunters Point. The great topic amongst gas investors in this vicinity for the week was whether or not Addicks had control of the old Brooklyn Company. We see no reason to change our statement of a week ago respecting the case; and if the owner of the Now Then can only get together the necessary money in 60 days he will undoubtedly cause the present management of the Company to Vamoose. Always provided, however, that he does not see fit to make a turn, which he could accomplish very nicely, if the statement circulated this morning is true. It is said to-day that the syndicate in control of the Citizens Company, of Brooklyn, has offered 160 for control in the Brooklyn—that syndicate has the money, too—and as control in the latter will not have cost Addicks over an average of 150, there is no good reason why the man-who-will-never-be-a-United-States-Senator should not take in an easy 10 per cent. All Brooklyn shares are feverish, and, as such, are a trifle dangerous to meddle with.

Chicago gas is at 79 to 79½, and looks to be cheap. Investors might do well to remember that a good time for getting out of Chicago gas would be shortly after the opening of the World's Fair. The general market is strong. We note the following sales at auction, all of Brooklyn City Companies: 45, Fulton-Municipal, at 138½; 700, Peoples, 90; 258, Brooklyn, at 134; 100, Williamsburgh, at 127; 23, Metropolitan, at 110.

[OFFICIAL REPORT—REVISED BY THE SECRETARY—CONTINUED FROM PAGE 818.]

FIFTEENTH ANNUAL MEETING OF THE WESTERN GAS ASSOCIATION.

HELD AT DETROIT, MICH., MAY 18, 19 AND 20, 1892.

FIRST DAY—AFTERNOON SESSION.

The President announced that the next paper to be read was that contributed by Mr. William A. Stedman, Jr., of St. Louis, Mo. As Mr. Stedman was unable to be present at the meeting, the President called upon Mr. G. T. Thompson, of St. Louis, to read the Stedman paper, which was as follows:

EVERYDAY GAS ANALYSIS.

It is popular belief that regular and valuable methods of gas analysis are beyond the capacity of most gas engineers. The only requirements, however, for a mode of analysis that shall enable any one to know what his purifying house is doing, and in a large measure to explain the dark mysteries of his photometer, are a few cheap absorbents, and some suitable form of measuring apparatus. With two or three graduated tubes of such a shape as to allow of their being readily carried from place to place, and by use of a small bore rubber hose, a connection can be made to any tap about the works, one or more samples of gas taken, conveyed to the place where they are to be examined, and an analysis made in a few moments.

Fig. 1.

One of the most convenient forms of measuring tubes is of this shape (Fig. 1), graduated on the long leg into decimal parts of the whole volume of the tube, the ratio between the bulbs and legs varying with the percentages in the whole volume of the constituents to be measured. Thus, for gas containing only a small percentage of sulphureted hydrogen and carbonic acid, which are about all the impurities the coal gas man cares to discover, a tube in which the bulb represents 900, and the leg 100 parts in 1,000, with 100 subdivisions on the leg, offers an accurate means of ready estimation of those gases. With water gas or producer gas, where the volume of carbonic acid, or carbon monoxide, is greater than 10 per cent., a tube carrying a smaller bulb, and consequently a larger percentage capacity in the leg is required. Such different tubes are called 10, 25, or 50 per cent. tubes, according to their graduation; those which form the basis of this article being 21 inches long (the bulbs ranging in diameter from 1⅛ to 1¼ inches, and the legs being ⅛ of an inch, external measurement), and cost $2.75 apiece. The few absorbents necessary can be procured at any drug store, and do not demand for their use any theoretical knowledge of chemistry. A moderately strong solution of caustic potash and some commercial arsenic are all that are required for ordinary coal gas analysis, while the addition of some sub chloride of copper, hydrochloric acid, and pyrogallate of potash will make up a laboratory the scope of which will be a surprise to the possessor.

To explain the manipulation of the measuring tubes and absorbents, suppose a connection to be made at the inlet to a center

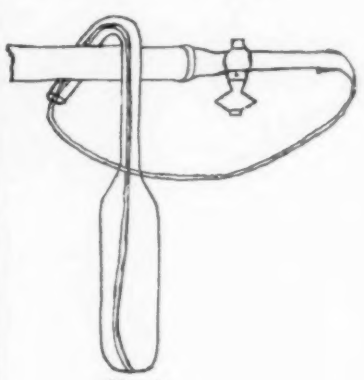


Fig. 2.

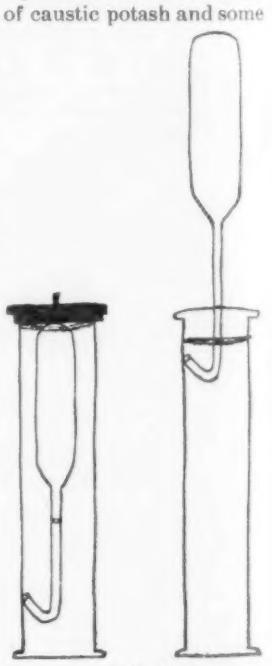


Fig. 3.

seal, through a ¼-inch tap, nipple and lamp-cock, with a piece of rubber hose wetted so as to be readily inserted into the measuring tube throughout its length; the cock is opened, and gas is allowed to blow into the tube for 5 minutes, or long enough to displace all the air previously contained. Now the hose is slowly withdrawn, and as its end emerges from the bend of the tube, the latter is closed with the thumb, or a rubber cork, the cock is shut off, and the tube full of gas is carried into the laboratory, where it is sealed by withdrawing the stopper under water. It is well to have a rack or rest, in which the tube may be placed in an upright position, on its bend as a base, while the absorbents are being applied. (See Fig. 2.)

To guard against variations of temperature and pressure, the tube should be immersed in a tall glass jar, of about 4 inches diameter, nearly filled with water, and fitted with a weighted cover to keep the tube completely under water. Such a jar will afford a constant temperature, while by taking the reading on the leg of the tube at the coincidence of the water level within the tube with that within the jar, equally constant pressure is obtained. (See Fig. 3.)

It is not necessary, for rapid calculation, to start with exactly 1,000 measures of gas for the difference in actual percentage of two estimates, one being 15 parts in 1,000 and the other 15 parts in say 960, will be so small that it may be disregarded.

Having read the measure of the sample of the gas to be tested, the tube is placed in the rack, the water is drawn off the short leg by a pipette, and replaced by the absorbent first required. Then the short leg is closed with the thumb, care being taken to exclude all air; the tube is inverted, shaken gently for half a minute, when it is slowly brought back to an upright position so that there are no bubbles left in the short leg, and the thumb is withdrawn under water, which rushes into the tube to replace the gas absorbed. Now a reading is again taken in the temperature jar, the observed contraction being the measure of the gas absorbed. The constituents further to be sought for are treated and measured in the same manner, until all which are required have been determined. The tube is finally washed with water precisely as it was filled with gas, and since all gases to be examined will be saturated with water vapor, it is not imperative that the tube should be dried before another analysis is made.

The chief gasses to be sought for, and their respective absorbents, are as follows:

In Coal Gas.—

1. Sulphureted hydrogen. Absorbent used—a solution of arsenic in water.

2. Carbonic acid gas. Absorbent used—a solution of caustic potash in water,

In Water Gas.—

Those mentioned under coal gas in their order, and—

3. Carbon monoxide. Absorbent used—a solution of cuprous chloride in hydrochloric acid.

4. Oxygen. Absorbent used—solution of pyrogallate of potash in water.

In producer gas, carbonic acid and carbon monoxide are treated in the order named. It is to be noted that in the estimation of carbon monoxide by cuprous chloride, an addition of caustic potash is needed to absorb the hydrochloric acid gas which is given off.

The determination of "illuminants" and hydrogen and nitrogen is not essential to the engineer, and may well be left to those equipped with large laboratories and a large amount of trusting faith.

The simplicity of the foregoing method of analysis renders it an object of easy daily observation, which faithfully pursued will teach its votary many lessons in cause and effect, and enable him to bring his candle-power and yield to almost friendly terms with one another.

Discussion.

The President—Gentlemen, this subject is before you for discussion.

Mr. Miller—In handling apparatus of the kind illustrated in the paper, of course we have to be very careful to always keep the thumb exactly right. In case the thumb were not in the best of working order, and a little of this potash were to get into a slight cut or scratch, it would not be very comfortable. Another thing, this is always measured when the bulb is wet. As far as I can understand, he keeps it immersed in water and raises it when reading the volume of gas. Any variation in temperature or a draught in the room, unless you can use it in a room where there is no draught, would produce a very great variation in volume, and where you have gas with only a few degrees variation of temperature, it will make some very remarkable results.

Mr. G. T. Thompson—In the case of the measurements, you understand they are all made in the water. Now, the temperature of that water and the temperature of the jar will not vary. The measurements are not made with the graded tube exposed to the air; they are altogether made under water.

Mr. Miller—I did not quite understand from the reading of the paper that the measurements were made under water. I understood that this bulb was kept under the water and then, when the measurements were made, it was raised out of the water, leaving only the neck under water. That would leave the bulb subject to the surrounding draughts and to very rapid evaporation. This wet surface would be subject to very rapid evaporation, and any variation in draught would produce a very great variation in temperature.

Mr. G. T. Thompson—In the first place, the measurements are usually made in a room, and, in the second place, in raising your bulb from the temperature of the jar, raise it to where you want it, and it is only necessary to hold it poised there for the fraction of a second, and there will then not be difference enough to make any practical effect in the measurement of the gases considered in this paper.

Mr. Bredel—I would say that the sequence of analysis for carbon monoxide and oxygen ought to be reversed. The oxygen ought to be reversed. The oxygen ought to be absorbed first, otherwise the vaporous oxide solution will absorb the oxygen. I do not see any other mistake in the entire paper, or anything to improve upon.

Mr. Chollar—In answer to the remarks of Mr. Miller I would say that almost anybody's thumb will stop the end of the tube all right. There is no trouble with it in reading off the volumes. If there should be any error by expansion, a person will see it. There is no difficulty with the experiments, and the small instrument is worth a great deal more than the reputation it has got in the books. It is written down as being inaccurate and not at all reliable, but if one will use it with a little care he will find that for ordinary purposes it is quite as good as the most elaborate apparatus for ordinary purposes, and convenient. Mr. Bredel speaks about the order of taking out the different parts. The oxygen should have been removed first and the carbon monoxide afterward.

Mr. Young—The greatest error I see in regard to the expansion would be in taking the bulb in the fingers. That of course would change the temperature.

Mr. Chollar—Take it below the neck; or, you could use a clothes-pin.

Mr. Young—It absorbs heat very rapidly and you must move very quickly with it.

Mr. Chollar—You are looking at it, and if there is any movement you can see it.

Mr. Young—Touching it with the hand would change the temperature.

Mr. Chollar—The graduation is very fine and if the gas is expanding you can see it moving; but there is no trouble with it.

Mr. G. T. Thompson—I was very much in hopes that Mr. Stedman would be present here, not only to read his paper but to make a demonstration of it.

Mr. Somerville—I was just going to say that the young gentleman—I suppose he is the son of the father whom we all know and respect—deserves great credit for his excellent paper; and it would be a good thing if the younger members of the Association would follow his example. He says at the close that it would "enable him to bring his candle power and yield to almost friendly terms with one another." I would suggest to him that if he tries the specific gravity of the gas, which operation is very simple and easily done, he and others will find that also a great help in bringing the yield and candle power together.

Mr. Chollar—The apparatus is accurate to this extent in my experience, that with the different samples, that are of the same quality, not varying, the determinations of sulphureted hydrogen will be so near alike that you cannot tell the difference from one to the other. There is possibly a little error on account of the absorption of a very small quantity of sulphureted hydrogen in the water, but that is easily determined. The correction for that is from 3 to 5 per cent. of the amount of impurity in the gas. When you have 1 per cent. of sulphureted hydrogen in the gas, if you allow one part in a thousand in addition to what you have determined, you would be correct if you wanted to be very particular, but in practical work in the determination of sulphureted hydrogen it does not make a particle of difference whether it is 9½ or 10 parts on a thousand. The apparatus is as good as any. I would like to say that in the determination of oxygen in air the books state that an average specimen of air contains 20.7 per cent. of oxygen. We have often determined it in the air and got 20.60. The tube is accurate enough for practical purposes.

On motion of Mr. Howard a vote of thanks was extended to Mr. Stedman for his excellent paper.

THE QUESTION BOX.

Mr. Jenkins—As Mr. Odiorne is not here, I would suggest that rather than take up any other paper this afternoon we devote part of the time to answering the questions in the question box.

The President—While we are waiting for Mr. Odiorne we might consider the first question on the list which is as follows: "What experience has been had in the spontaneous combustion of coal; and what is the best preventive of the same?" Is any one prepared to answer the question. Mr. Lansden ought to be able to answer that.

Mr. Lansden—Well, I do not know why you have called on me. I have charge of works that have had quite a fearful accident of that kind, but it was before I took charge. I use a rod and take the temperature of the coal in that way. I have had it up to about 85° or 90°, and that is as high as I ever got it, but coal of that kind we put out of doors now-a-days.

Mr. Miller—I think the English Parliament appointed a Commission to look into that subject. They had a great deal of trouble in the carrying trade to India, and this Commission tried to find some connecting link between spontaneous combustion and the chemical composition of the various coals. I do not know whether they ever came to any results as far as that is concerned, but they recommended that cartridges, made of short pieces of pipe and filled with compressed carbonic acid, and furnished with a fusible plug, be distributed throughout the coal pile. In case of an elevation of temperature this plug would fuse and the carbonic acid would smother any fire that had started. Whether that has ever been tried or not I do not know.

Mr. Somerville—The best preventive for spontaneous combustion is this, let the air circulate through the coal. It is only by the non-circulation of air that spontaneous combustion is possible, and the best way to accomplish this is to have posts or columns through the coal so as to break it up into smaller heaps. By the use of these columns which are hollow, you will see that it subdivides the mass and allows a certain amount of air to percolate through. Mr. Lansden's plan—to periodically take the temperature—is also good; but I believe where the plan of putting posts through the coal has been adopted there has been no spontaneous combustion.

Mr. Harper—It may be interesting to the gentleman who asks this question to know that one of the best experts in England published an article on this same question, which appeared in the *Journal of Gas Lighting* within the last month or so—I am not able to give the exact date.

The President—As we have been unable to find Mr. Odiorne, and as we have about three-quarters of an hour before the afternoon session will close, it is thought best to call up the paper following Mr. Odiorne's which is,

FUEL GAS AS VIEWED THROUGH A COAL GAS MAN'S SPECTACLES,

by Mr. K. M. Mitchell, of St. Joseph, Missouri. Mr. Mitchell, I am sorry to say is not present, but Mr. Jenkins has volunteered to read the paper.

Mr. Jenkins read as follows:

With the advent of natural gas, bringing with it as it did so many beneficent results in industrial pursuits and domestic life, naturally the mind of the entire gas fraternity was turned upon the problem of providing fuel gas; that is, fuel gas that would take the place of coal, not only in localities where natural gas could not be found, but also in localities where natural gas was found, in anticipation of its giving out at an early day. This problem has not been solved, though we all cherish the hope that some day it may be.

In looking over the various processes for making fuel gas we see several methods of accomplishing the same end. It is pretty generally conceded amongst fuel gas men that a process which will allow of bituminous coal being charged into the top of the retort or generator, and pass down by gravity until the several processes of distillation are completed, leaving nothing but the clinker and ash to be removed at the grate below, is the most desirable.

The value of the resultant gases for quantity and quality depends upon the quality of the coal introduced into the generator, as the heating agents are hydrogen, carbonic oxide, marsh gas, and a small per cent. of olefiant gas.

To produce a gas that is richest in heats units you must have a coal that produces a large quantity of good coke. In order to decompose the steam, incandescent carbon is necessary. The composition of gases from bituminous coals is given as follows: Hydrogen, 54.5; carbonic oxide, 36.4; carbonic acid, 1.6; marsh gas, 7.5. It is also absolutely necessary in vending a fuel gas, particularly a gas which contains over one-third of its volume of deadly poison, and which is to be used for domestic purposes, that it have a distinct and positive odor, an odor that will be lasting when mixed with air.

It will be seen by the above analysis that the only odor to the gas is from the small per cent. of marsh gas. In our regular illuminating gas we get the well-known carbonaceous odor from over 42 per cent. of its volume. The slightest leak upon a fixture or burner accidentally turned on, or burner in gas stove, which may be extinguished from boiling over of the contents of a kettle, is quickly detected and remedied. Not so with fuel water gas. If a burner is accidentally turned on and not lighted the presence of the deadly fluid is not detected by the victim.

Symptoms of poisoning from carbonic oxide are as follows: Burning feeling in the skin of the face, followed by giddiness and headache. Headache grows more intense, and chief point is in temples. There is strong pulsation in the temporal arteries. There is also nausea with peculiar noises in the ears, and, as the poisoning advances, there is loss of consciousness. There may be also, according to Boehm, in "Ziemssen Encyclopedia," loss of mind, or a pleasant, ecstatic feeling, a sense of fatigue both mentally and physically, eccentric pains in the limbs, and certain peculiar disorders of the skin.

In order to remedy this great objection to fuel water gas, fuel gas makers have introduced into the gas while being generated a few gallons of oil to each 1,000 feet manufactured.

Another plan is to allow the purified water gas to pass over crude Lima oil which is periodically injected upon the water in the gasholder tank. The latter plan gives to the gas a perceptible odor at the point of escape, but the odor is not enduring and clears away or separates from the gas quickly.

In previous discussions on fuel water gas the relative values of coal gas and water gas by volume have been stated to be 666 and 292 respectively. In the AMERICAN GAS LIGHT JOURNAL for March 21st, 1892, Dr. E. G. Love is quoted as saying that the common coal gas of London, with an illuminating power of 16 to 17 candles, has a calorific power of about 668 units per foot, and that the product obtained by decomposing steam by incandescent carbon, as effected in the Motay process, consists of about 40 per cent. of carbonic oxide and a little over 50 per cent. of hydrogen. This mixture, he says, will have a heating value of about 300 units per foot. This is, in my judgment and experience, about the correct value.

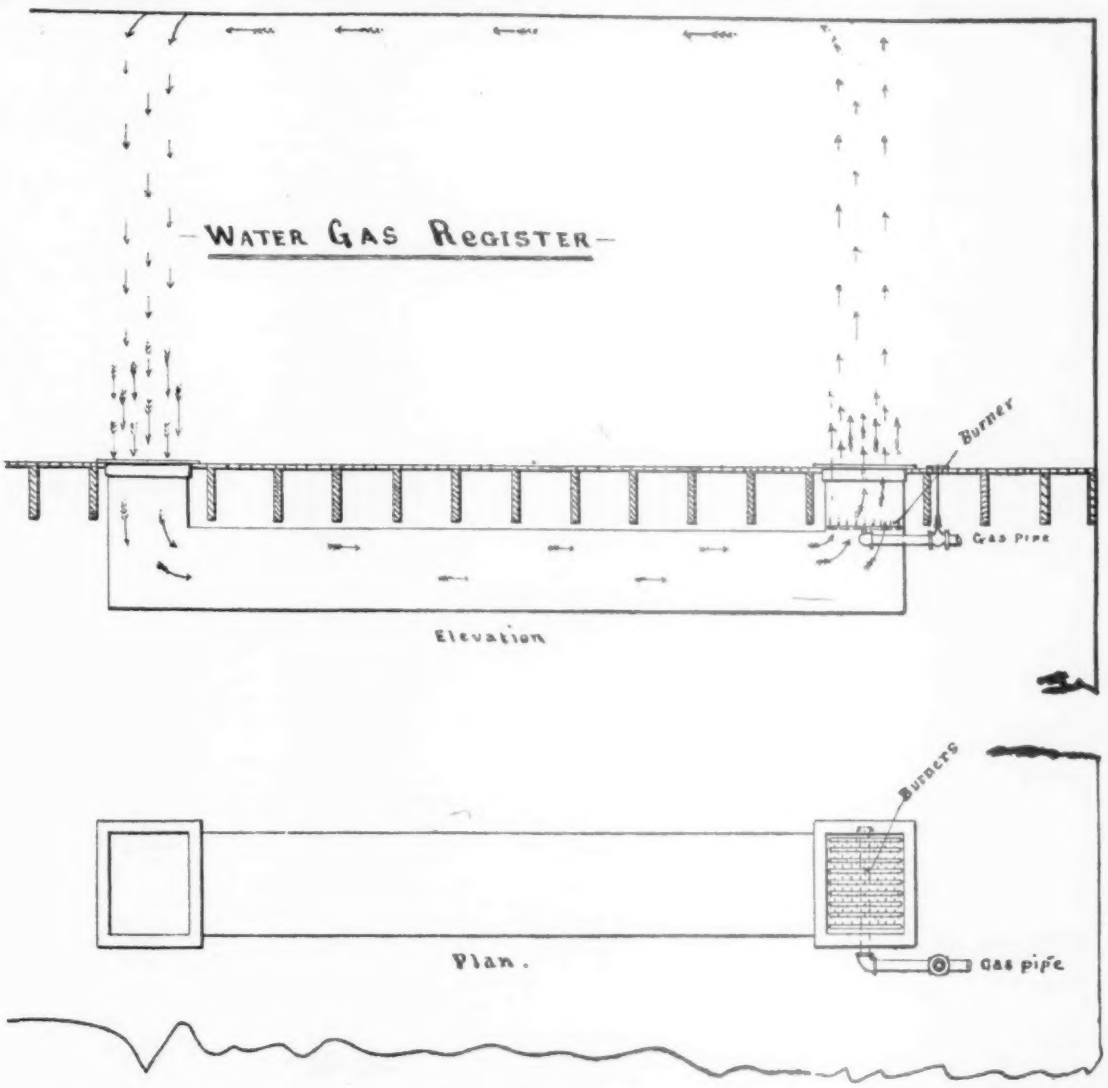
Although it has been stated by the advocates of fuel water gas that the air dilution, necessary for the complete combustion of illuminating gas, detracts from its theoretical value 50 per cent., it is also said in favor of water fuel gas that the heat is intense and concentrated. This is also true of the arc electric light; the heat is intense and local. Yet, we want gas for the purpose of boiling water, heating our ovens, etc. The gas that will give us a uniform heat in our ovens, a general heat around our boiling vessels, is the one to be most desired.

The question to the consumer is not what is the theoretical value of the gas or air dilution to complete combustion of the gases, but how much monetary value can he get out of them, *i.e.*, how many feet of gas will I consume a month doing my cooking or heating by gas when consumed in the best means at hand.

We have before us two cooking stoves for example. They are both of the best and latest patterns, made especially for the work for which they are intended. They have four holes or burners on the top and two burners for the broiling and baking ovens. One is a stove fitted to burn coal gas, 16-candle power; the other is fitted to burn fuel gas with no illuminating power and of the composition as given in the before mentioned table. We must gauge the stoves so that when in use the work can be done as expeditiously with one kind of gas as with the other. With the coal gas cooking stove we heat the oven in 15½ minutes from a temperature of 76°, ready for baking, consuming 6½ feet of gas. We place in the oven a six pound pan of bread, regulating the gas to properly bake the bread. When baking is done we note the time from the lighting of the burners to the completion of the operation. Total number of feet of gas burned, 17.5; pressure of gas, 14.10; total time, 1 hr. 33 min.

With a fuel water gas stove of the same dimensions we heat the oven in 17 minutes from a temperature of 76°, ready for baking, consuming 20 feet of gas. We place in the oven a six and one-half pound pan of bread, regulating the gas to properly bake the bread. When cooking is done we note the time from the lighting of the burners to the completion of the operation. Total number of feet of gas consumed, 64; pressure of gas, 32.10; time, 1 hr., 28 min.

In boiling water upon the coal gas stove we place over one of the top burners a vessel containing 2 quarts of water, temperature, 48°. We



bring the water to a boiling point in 10 minutes' time, consuming 2.8 feet of gas.

In boiling water over a fuel water gas stove we place over one of the top burners of the stove a vessel containing 2 quarts of water, temperature, 48°. We bring the water to a boiling point in 11 minutes' time, consuming 5.5 cubic feet of gas.

We light all the burners of the coal gas stove ; gas consumed, 60 feet per hour ; pressure, 16.10. All the burners of a fuel water gas stove lighted consume 160 feet of gas per hour ; pressure, 32.10.

I have in my mind a room heated by fuel water gas. The arrangement of the heating apparatus is unique, and I herewith present a rough sketch of the furnace or gas register.

You will see by the sketch the whole of the products of combustion pass into the room. The second register at the back of the store room is connected to the front register, or, in other words, the registers 1 and 2, at the front and back of store, are connected together by means of a galvanized iron duct below the floor. The gas jets or burners are fitted in the vertical portion of air duct in No. 1 register. The heated air and gases rise in the room. The heating of the air in No. 1 register causes a draft in No. 2 register and draws the air along the duct to No. 1 register to be heated. The air in the room is kept in constant circulation. The size of the room is 20 x 50 x 10. From December 7th to March 29th (leaving out 17 Sundays), we have 96 days of heating. The average temperature for the month of November was 34.2°; December, 33°; January, 16.5°; February, 33°, and March, 33°. The amount of gas consumed in the 96 days was 90,800 cubic feet. The store was open 10 hours per day. The temperature of the room was about 65 to 70° during the coldest of weather. The apparatus seemed to give satisfaction as far as heat is concerned. Nothing is said about the condition of the atmosphere with this volume of carbonic acid produced and pouring into the room. What the occupants of the room suffered during this time I am not prepared to say.

In another instance we have a young ladies' institute, heated by water gas, using gas heating stoves as made by the Chicago Gas Stove Company. They are sheet iron stoves, open in the front, with horizontal burner. In each horizontal pipe there are inserted lava tips, the flames from which are directed against an inclined plate holding tufts of asbestos. The stoves are connected to a flue and the products of combustion in this instance pass up the chimney.

	No. of Stoves.	Size.	Hours Burned a Day.	Ft. per Hour.
Sitting room	1	10	16	62
Parlor	1	10	3	62
Reception room	1	10	14	62
School room	1	12	14	75
School room	1	10	6	62
Repository	1	12	6	75
Bed room	1	12	3	75
Bed room	1	5	2	31
Bed room	1	5	2	31
Bed room	1	5	..	31
Bed room	1	5	4	31
Bed room	1	5	9	31
Bed room	1	5	4	31
Elocution	1	5	1	31
Music	1	5	14	31
Music	1	5	14	31

Amount of Gas Consumed.

October—46,500 cu. ft. at 50 cts. per M	$23.25
November—121,900 cu. ft. at 50 cts. per M.	60.95
December—147,000 cu. ft. at 50 cts. per M	73.50
January—188,000 cu. ft. at 50 cts. per M	94.00
February—154,300 cu. ft. at 50 cts. per M.	77.15
March—157,600 cu. ft. at 50 cts. per M	78.80
April—121,900 cu. ft. at 50 cts. per M	60.95
	$468.60

In addition to this, there was used in gas range for cooking purposes, 169,200 cubic feet of gas for the nine months. We will assume that 40,000 cubic feet will be consumed in the remaining three months,

making 209,200 cubic feet, cost $104.60. There was used, during the cold months, 19 cords of wood at $4.50 per cord, making $85.50. Total money paid for heating and cooking for the year, $658.70. Cost of fuel for the same time—the year previous—50 cords of wood at $4.50; 20 tons of coal at $8.25 per ton; total $390.

In summing the matter up the writer cannot see where there is anything done by fuel water gas that cannot be done by the illuminating gas now at hand.

In cooking or heating stoves one foot of illuminating gas will do more general work than two feet of the fuel water gas. It takes less capacity of mains, meter, etc. For example, to convey a certain amount of fuel water gas a 10-inch main is required. To convey the same equivalent in heat units of illuminating gas a main of 7-inch diameter will do the work.

To measure the gas for a fuel water gas cooking stove a 10-light meter is required. To measure the illuminating gas for cooking stove of same size a 5-light meter is sufficient. Throughout the whole operation it is necessary to double the capacity of the works and distributing plant in vending fuel water gas as against a good illuminating gas plant.

In my judgment the secret of gas for fuel purposes lies in the cheapening of the price of illuminating gas used for this purpose, making the price of this article 80c., $1 or $1.25, according as you are more favorably located.

A gas plant is now in operation in St. Joseph which relies almost entirely for financial success upon the question whether its use as a fuel will displace solid fuel throughout the community. This gas is sold for 50 cents per 1,000, and does not carry over 300 heat units. The determination of the question will only be had after the artificial stimulants which are now offered the public to induce its adoption have ceased and opinion is allowed to pass strictly upon the merits of the gas.

Discussion.

The President—Gentlemen; this paper is before you for discussion, and we will be glad to hear from anybody who desires to speak about it.

Mr. Evans—I have listened to the reading of this paper with more than ordinary interest; and I, too, am very sorry that the author is not here. Nevertheless, I cannot let go by unchallenged some of his statements. First, I wish to call attention to the analysis of the fuel gas, as given by Mr. Mitchell, which shows 54.5 per cent. hydrogen, 36.4 of carbonic oxide, 1.6 of carbonic acid, and 7.5 per cent. of marsh gas. You will notice that all through this paper he has stated that this fuel gas has about 300 heat units. If any of you care to figure up the heat units that this analysis gives you will see that it figures 368 heat units. You will also notice that Mr. Mitchell calls attention to a comparative test of the two gases in bringing water from 48° to 212°. I believe he states that he brings two quarts of water from a temperature of 48° to 212°—raising it 164°, using 5½ cubic feet of fuel gas and doing the work in 11 minutes. If you will figure up the number of heat units utilized in bringing this water to 212° you will see that he has simply utilized 33.7 per cent., or a loss of 66.3 per cent. Is there any gas engineer present who would be willing to say those are the best results he could get from heating water? Then, again, I wish to call attention to a test that he has made in baking bread. He says he has used a gas stove—presumably of the best make—to bake bread, using fuel gas and using illuminating gas. He asserts that it takes 17 minutes to heat the oven first, using 20 cubic feet of gas, and that it required 1 hour and 28 minutes to bake the 6½ pounds of bread, using a total of 64 cubic feet. If he had removed the spectacles of prejudice things might have been different. Since receiving his paper I made a test of baking bread in a No. 2 Van Wie stove, using fuel gas. I found I was able to bake 6 pounds and 9 ounces of bread in less time and with less gas, and that in heating the oven it required but 5 minutes and consumed but 5 cubic feet. The bread was baked with 20½ cubic feet and the time was 34 minutes, the total quantity consumed in baking the bread and heating the oven being 25½ feet, and the total time consumed was 39 minutes. Observe the difference; Mr. Mitchell consumed 2½ times as much gas and took up 49 minutes more time baking even less bread. Then, again, still further along in the paper he states that a room 20 feet by 50 feet by 10 feet was heated with gas for 96 days, 10 hours per day, and that there was consumed 90,800 cubic feet of fuel gas. The average temperature outside was 29.9°, and the room was heated to an average temperature of 68°. The average amount of gas burned per hour was 94.6 feet. He refers here to the amount of products of combustion and the possibly serious effects that might occur to life while allowing these products to escape into the room; although he did not hear of any deaths he thought there might some occur which escaped his notice. Let us see what the products of combustion would be that escaped into the room burning 94.6 cubic feet of fuel gas per hour. I find that 500 cubic feet of carbonic acid and nitrogen were escaping into the room each hour; 5 pounds of carbonic acid and 34 pounds of nitrogen—a total of 39 pounds of impurities, Gentlemen, I think any of you will admit that if that room was being illuminated by illuminating gas that you could not do with less than 16 burners. If such were the case, then they were burning 5.9 cubic feet each, and would consume 94.6 feet per hour. Let us see what the amount of products of combustion would be in that room, and how people must suffer who use illuminating gas for illumination. The amount of products would be 950 feet per hour of carbonic acid and nitrogen. That would be 7 pounds of carbonic acid, and 66.22 pounds of nitrogen, the difference in favor of fuel gas being 190 per cent. And they continue using it for illumination; we do not hear of any deaths; we do not hear of any objections. Still further along in the paper Mr. Mitchell calls attention to the fact that fuel gas is as 292 is to 666. Then, if such is the case, the above illuminating gas should heat that room up to 117.5°. Why don't it do it? Because those are theoretical values. It should heat 130 per cent. more than the fuel gas; why don't it do it? Further, in his paper he says that the fuel gas plant depends entirely for its financial success upon the question of whether its employment as a fuel will displace solid fuel throughout the community. I see no mention of the fact of their using that fuel gas for illumination. He does not say in his paper that fuel gas is used for illuminating purposes in the city of St. Joseph in $\frac{3}{10}$ of all the business places throughout the city; he does not say that the fuel gas company sold over half a million feet of gas per day in December; he does not say that the fuel gas company has removed 700 of his meters; he simply asserts that it depends entirely upon its fuel. Gentlemen, I am in the fuel gas business, and I am only sorry that Mr. Mitchell is not here; for I would certainly like to have him reply to some of these statements. "Consistency, thou art, indeed, a virtue!" Is this consistency?

The President—We would like to hear some further remarks upon this subject. There must be many that are prepared to say something.

Mr. Lansden—I would like to have Mr. Young give us his experience. I think he has had the most varied, intelligent experience in regard to heating with fuel gas. The illustration that I want to bring out is this: You take a city of, say, 300,000 inhabitants, and, from Mr. Young's experience, as I recollect, he found that the average consumption of fuel gas was about 3,000 feet a day to the consumer by meter. Now, in a city of 20,000 consumers, burning their furnaces and their fires, depending entirely upon its fuel gas for heating, this would represent a consumption of 60,000,000 per day. How many times through the winter, in almost every climate except the extreme north, do we want to stop our furnaces. Now, imagine a city being supplied with fuel gas, say 20,000 consumers burning 3,000 feet of gas a day, who shut their gas off to-day, and to-morrow they want to use it. How will the question ever be settled unless by 50 to 60 million storage capacity, or an immense number of men kept idle to watch the varying conditions of the weather. The fluctuation we have with illuminating gas is very wonderful. One of the greatest questions in London to-day is the fogs. They tell me there they have some days a fluctuation of 35 per cent. in the gas consumption. What a wonderful expense that is to them. The question with them to-day is an apparatus by which they can make up for this fluctuation, merely in light; but, imagine the fluctuation we would have for heating, in comparison.

Mr. J. Young—I have had considerable experience with fuel gas—not with the manufactured, but with the natural article. We began, first, by supplying the gas by contract—it was so plentiful; and we supplied our consumers at such low prices that they simply retained their old coal appliances and burned the gas in those with the result, I suppose, that something like 75 per cent. of the heat went up the chimney. Within the last two years we have been supplying almost exclusively by meter. The first charge by meter was 8 cents per 1,000 cubic feet. It was afterwards raised to 10 cents, then to 15 cents, and now we are selling at 20 cents. We have found that the result of the rise in price has been to induce people to put in more economical appliances, if they want to use natural gas for fuel purposes. During this last winter, when we raised the price from 15 to 20 cents, we found a great majority of our consumers fitted up their houses partly or wholly with some kind of economical appliances. The result has been that, while a number of people have partially discontinued the use of natural gas, we have lost very few consumers altogether. They still use it in some parts of the house, in bedrooms and for cooking purposes; but a good many have shut off their furnaces where they did not have those of the proper

kind, as they found it too expensive. Of course, in large houses, to people who do not care for the few extra dollars cost in their housekeeping, it makes very little difference. I notice in the paper of Mr. Mitchell that a large building there in St. Joseph has been heated with manufactured fuel gas in St. Joe for a cost of $660, I think the sum is, or about double the price it would cost for heating the same house with wood; and the total consumption of gas was something over a million feet for that whole house. If it had been natural gas at 20 cents per 1,000 that was used in those appliances, you can see that that house would have been heated for a very small amount of money. If appliances of that kind were in every house we could still raise the price of gas a great deal; but we have this difficulty to contend with in natural gas—people do not believe it will be permanent; and the owner says, "I am not going to the expense of $100 or $200 to put in a lot of appliances in my house, because you cannot tell me whether you will have natural gas next year or not; if I were assured that we would have natural gas always, then I would go to that expense." The tenant of a house says, "I am not going to the expense of putting economical appliances in another man's house." All these objections come up about putting in economical appliances for the use of natural gas. I do not know of any process by which manufactured fuel gas could be made to compete with coal in Pittsburgh; even at 10 cents I am sure it would run a good deal higher than coal. Of course, as I have said, I have had no experience in manufactured fuel gas; but the natural gas companies are extremely anxious to find some substitute to take the place of natural gas when it is exhausted, and I think a great deal can yet be done in the way of utilizing all the heat that fuel gas can produce, and thus assist in making the manufactured article a possible success. I do not know that I have anything further to say on the subject.

Mr. Somerville—I have a few notes here which I expect you (addressing Mr. Cowdery) can say more about than I can, for they were taken from your report on Hyde Park, Chicago, fuel gas.

Sample No. 1.

CO	33.3
H	49.1
CH_4	3.7
CO_2	5.8
O	0.0
N	8.1
	100.0

The heat units contained in the gas are 322 per cubic foot, which goes to show, I think, that Mr. Mitchell comes very near the truth. Sample No. 2, same kind of gas, gave, heat units, 320; sample No. 3, heat units, 318; and the average efficiency was 48 per cent. Now, sir, if I remember rightly, when you made these experiments you took some precautions to get the full benefit of the gas that was heating the water. As I understand, from Mr. Mitchell's experiments, he did nothing of the kind, but used a common stove, and treated the water as in everyday use. So that I have no doubt this will account for the difference in the efficiency of the two experiments. A slight draught or movement of the air would make the difference. As to the other test, of baking bread, it seems to me to be a question of whether he would want it done or undone. Mr. Mitchell wants his a little brown; this other gentleman does not. This is all the difference. There can be no question at all that there are just one half the heat units in this fuel gas that there are in 20-candle coal gas. This thing, of the efficiency of the gas, is where the fuel gas men make a great mistake. They say that, in a ton of coal containing 27,000,000 heat units, only from 10 to 13 per cent. of the heat is utilized, whereas, in using gas for heating, all the heat is utilized. There cannot be a greater delusion than this; and this is just where the trouble comes in. I have experimented with natural gas under our boilers, and have almost come to the conclusion that there is as much heat wasted in using gas as there is in using coal. Remember that the flue has to be heated, and that means a great waste of gas and heat. If, as Mr. Young has intimated, we can ever get appliances to utilize all the heat units in the grate, then there would be some prospect of using this gas, but it never can be done. The flue must take off the heated products, and this means always a tremendous loss of efficiency in any kind of fuel that is used. This sketch of Mr. Mitchell's, showing the products of combustion entering into the room, will never work; people could not stand it.

Mr. Highlands—I also have had some experience with fuel gas, and to say that I am a disappointed man to-day does not half express it; indeed, I feel very much abused. Up to 4 years ago I lived on Fremont street, in Allegheny, and bought my natural gas from Mr. Young. The price was very low, being a lump sum per year, and I was very well satisfied with it; but I knew that he felt then, as he does now, that the time might come when he would be compelled to raise the price of gas, so I moved out to the East End of Pittsburgh. They charged me 10 cents per 1,000 for natural gas, and as I was burning from 75,000 to 130,000 feet a month, I could not stand it. I heard of the West, where fuel gas was plenty and cheap, and I moved out here for the purpose of getting it; and now I am told by the Messrs. Young that I cannot get it out here. It is not fair. While in Indiana I piped the towns of Muncie and Marion, and supplied them with natural gas. We had about 380 pounds pressure—it was in the fall of the year, and everybody had all the gas he wanted. All we had to do was to rake in the shekels, and we did it. We had a cold snap about the first of the year, and then we did not have any gas at all, apparently, while the day before we had lots of it. We found some friend in Washington, Pa., who wanted just such a plant as we had, and he got it. But I as yet was not satisfied with the matter. The Philadelphia Company, of Pittsburgh, was afraid that natural gas was going to give out, and they went across to the South Side and built a small experimental plant to make fuel gas, the operation of which I watched very closely. My friend Mr. Young knows something about that plant. They had about $100,000 worth of experience before they got through with it, and as yet do not have an artificial gas.

The President—Mr. Humphreys, I think some of your companies have had an experience with fuel gas.

Mr. Humphreys—I do not think I am in a good position to-day to say much about fuel gas. We have had considerable experience, and we have gained a great deal by it, in some directions. Some of the points raised by Mr. Mitchell are confirmed by our experience, but we do not consider our experiments and work are at an end, and I, therefore, prefer to withhold my last word. I think, in one or two points, the criticism of Mr. Mitchell's paper would be hardly fair. For instance, the comparison is made between the burning of so many burners up in the ceiling, giving light, and the burning of the same amount of gas in a special furnace, let in the floor of room as shown in Mr. Mitchell's paper, with the result that the air of the room is pumped over and over again to supply oxygen to the furnace. I do not think that is a fair comparison at all with the burning of illuminating gas up in the ceiling, where the products of combustion are delivered above the heads of the occupants of the room, and where it is presumed we will have some chance to carry them off. I know my own experience in one or two cases where I have sat in rooms equipped with these furnaces, and with every desire to find them a success, and without having any predisposition to headache, that I was able to stand it only about half an hour. I think another unfair way to look at it is to assume that Mr. Mitchell claims that death results from the use of these furnaces. I do not think that is fair. I presume he was referring simply to the injury to the health of those constantly living in a house heated in that way. We all know it would not be conducive to health to use carbonic acid and products of combustion generally in the place of oxygen for filling the lungs.

The President—I think some of the remarks made by Mr. Evans are misleading. He is repeating some of the experiments of Mr. Mitchell, doing the work as quickly as it could be done, and using as much gas as is necessary to do it in that short space of time. We all know that to get the greatest efficiency from any gas we must do the work we have to do quickly. There is no doubt he could bake his bread in 38 minutes, and bake it so that it would be done and have very good bread—and he could not bake it in much less time than that; but he has made his comparison with Mr. Mitchell's use of coal gas in a longer time. If Mr. Mitchell was allowed to repeat his experiments and use gas enough to do it in the same length of time that Mr. Evans did his, the proportion of gas used would remain about the same. This result has been tried again and again by everyone, and it remains a fact that the practical efficiencies obtained from the different gases are about in proportion to the number of heat units, as shown by analysis. That cannot be disputed. My own experiments with gaseous fuel for heating purposes amount to this. I thought the best way to use gas for heating purposes was by means of the hot water system of heating; and to determine exactly what could be done in practice, I found a house in Milwaukee which seemed to have as good a system of hot water heating as any that I ever came across—it was a brick house, two stories, and contained about 26,000 cubic feet of space to heat and was kept warm all through the season. The owner stated that he used from 9 to 12 tons of hard coal a year, and that was all, which would show that he had a good system. I had built a heater in which gas could be used for heating the water to the very best advantage. I rebuilt that heater 2 or 3 times, at a total cost of about $150, to put it into that house so as to get the best

results from the use of gas. We used illuminating gas, or the same that we were furnishing for illuminating purposes, and that was used so that the products of combustion went to the chimney at from 100° to 120°. We used that all through the month of April, a year ago. The total temperature averaged a little less than 30° throughout the month. The average consumption of gas for the 24 hours was 1,700 feet. It proved conclusively to me that our illuminating gas was worth 30 cents compared with hard coal at $6 a ton for that purpose and used in that way. This was out of the question, of course; it was too expensive. We repeated the experiment in another house in January this last year; a single room in the northwest corner of the second story of the house, was used on account of our prevailing cold winds coming from a northwesterly direction. We used a "Reflector Heater," and had the heater in the room, which was the only means there was of heating. We found the cost by that system was $2.25 per 1,000 cubic feet of space heated; whereas, in the first experiment, it cost $1.50 per 1,000 feet of space heated. We gave up the use of gas for heating purposes, believing that it could not be done at satisfactory prices.

Mr. Evans—Referring to the remarks of Mr. Somerville regarding the underdone bread. I am afraid he is not very familiar with the baking of bread, or he would be aware that it can be baked, and baked right, in that number of minutes. I will state for his benefit that the bread I baked was overdone; in fact it was quite brown. If he will make a few experiments in that direction he will learn something about cooking. Speaking of the products of combustion going into the room, referring to what Mr. Humphreys has just said, I do not claim that it is a proper thing to permit the products of combustion of any gas in any large extent to go into a room. The case referred to by Mr. Mitchell was a store. The opening of the door at frequent interval supplies fresh air. Referring to the products of combustion from the burners not being a fair comparison, I think the burners in illuminating a store are pretty well distributed, and a current of air is continually created towards each burner by the burning gas. As to the variation of temperature between the ceiling and the floor, there might be some disadvantage in making the comparison I did; but does it vary 190 per cent. That is the point I want to make. Then, again, speaking of fuel gas, I do not say that fuel gas can be used at the price we sell it to the exclusion of other fuel. It never suggested itself to me—it is not true; but is it not a step in advance, and is not the very thing that all of you gentlemen are aiming at, to get the price of gas reduced to a point where consumers can use it for fuel purposes? We have a striking example right in Hyde Park, Chicago. We have a plant in operation there. It is easy to get there, and any of you gentlemen are at liberty to investigate what we are doing. We are selling gas at 50 cents a 1,000, and the result is identically the same as it is in Grand Rapids, as it is in Milwaukee. You put down the price of your gas and you double your consumption. Why is it? Because you are selling it at Milwaukee for 80 cents, and when we sell it for 50 cents the people realize that the gas is cheap and will use more of it. Now, I do not see why you gentlemen object to fuel gas, even if it is a non-luminous gas. We use it with appliances that are best adapted to using it right. As I was going to remark, to give you an idea of the increase of our business in Chicago, last month we set 273 meters, and we have so far this month set 163 meters; we are 215 orders behind on gas ranges. We have out in Hyde Park about 1,700 gas ranges. Is it growing on its merits? or what is the reason that people apply for it so fast that we are actually unable to fill the orders. Is there not a reason for it?

Mr. Humphreys—I would like to ask Mr. Evans, only if it is a fair question, of course, what was the average price netted for the fuel gas sold at Hyde Park?

Mr. Evans—The average price netted was a trifle over 50 cents, because our gross price is 70 cents, and we make a discount of 20 cents per 1,000, when it is paid before the 12th of the month.

Mr. Somerville—I trust that Mr. Evans will not go away from here with the idea that any of us is opposed to fuel gas. Nothing could be further from the truth. We are all in favor of fuel gas, or gas for fuel; but the question is, how to make it in the best and cheapest way.

Mr. Egner—I have had a little experience with fuel gas. I spoke of it a year ago to this Association. I was requested by the President of my Company, who is also a member of this Association, to convert one of our water gas works into a fuel gas plant, just to make non-carbureted water gas. We did that, and advertised fuel gas, I believe, at 50 cents per 1,000. After advertising we obtained, I think, only some 16 or 17 applicants, and consequently did not operate the works at all. Some time after that we were ordered to change a water gas apparatus that we had at one of the stations and to make fuel gas with it. I left St. Louis shortly after the beginning of the trial, but I believe they are not selling any fuel gas now. The Company had some 30 miles of mains, which they had acquired through the purchase of the plant of an opposition Company which went out of business, and which had not yet been put to other use. The Company was going to give it a fair test, and I believe it did; but I am informed they are not using any fuel gas now. The Company offered to sell the gas finally at 30 cents per 1,000, but the trial with fuel gas was not a success. I have been through the country a good deal lately, and I have seen that fuel gas for other than domestic purposes is successful wherever tried. I visited a works near Philadelphia, at Tacony. They used gas there for melting, annealing and tempering steel, and in forges; and I can say, from my own observation and information given me at the works, that they would use three times as much coal, if fired direct, to do the same work that they now do with the same coal turned into gas. I have been elsewhere, and have seen a like state of things, so that, for industrial purposes, it seems to be a very desirable thing; but for domestic purposes, my experience would point out that fuel gas has not yet reached that state of perfection which would lead us to make use of it with success as against our illuminating gas, employed in properly constructed gas stoves. The latter is decidedly to be preferred in point of economy, even by the consumer.

Mr. Evans—I do not think this is a parallel case at all. In the first place, Mr. Egner admits that he makes a partial producer gas. I would like to ask him two questions; first, how many days did he run that plant? and, next, did he have practical burners to burn that gas?

Mr. Egner—I should like Mr. Thompson to say how long they ran it; because, as I stated, I left St. Louis before they actually made gas for sale. The apparatus itself had been run for several years for making illuminating, but not fuel gas. I do not know how long it was run for making fuel gas only.

Mr. Thompson—The apparatus was run upwards of three months. It was discontinued the 1st of October last. The burners we used were in some cases the special burners made for the use of fuel gas, and in some places the ordinary Bunsen burner, with the air ports stopped up.

Mr. Coverdale—I would like to say a few words on this question. I hope Mr. Evans will not go away from here even thinking for a moment that coal gas men are opposed to fuel gas, because they are not. I remember a great many years ago there was a fuel gas works erected at Utica, N. Y. The brother of a friend of mine who lived in Frankfort, Ind., was interested in the works, and he induced me to go to Utica to see that town lighted up with fuel gas. I did so, remaining there two or three days. They were kind enough to give me a couple of the burners which they used for fuel, but for lighting their streets they used the ordinary Fahnehjelm burner. Now, I know that our men at that time were opposed to fuel gas. One of our members wrote a paper at our convention on water gas—it was a very nice paper too, and I believe he was honest in it; but, we all laughed at him. I said then to the convention that it would be wise not to laugh at his paper, that we ought to investigate it, when if there was nothing to it that would be the end of it, but if there was we had better take advantage of it. Now what do we see to day; there are water gas works in more than 100 places, and there is hardly a gas man to-day who will say anything against water gas. Those who do not have water gas would like to have it on dark days when they need a little more gas. The next thing to come up was electric lighting, and when they talked about lighting cities with incandescent lights I believe the majority of the gas men laughed at the idea—it could not be done, and yet it is bothering us all to-day. Now, we have got down to fuel gas. I happened to be in Jackson, Michigan, where they had a fuel gas plant. The town was lighted up with fuel gas used in Fahnehjelm burners. I tried to find something that would benefit me. I remained there two or three days, and I saw probably 100 men who were burning that gas. I was in several houses where they used the gas for cooking and lighting. They also had electric lights. They were not burning them because they liked the fuel gas better; it was cheaper, for one thing, and it gave a better light. Now, I don't know anything about the cost of making fuel gas. Mr. Evans may have a place in Chicago, or St. Joe, or somewhere else, where he has the very best machinery. I know I have a friend in Hyde Park who I believe is a pretty smart old fellow. He took a great deal of interest in trying to post me, and his last letter to me said that the people liked the fuel gas, and they had 3,900 applications for meters that were not filled. These are facts. Now, how do we know what kind of a fuel gas is going to be the fuel gas of the future? I believe every man in this room ought to investigate that matter for himself, as to whether it can be made. I do not care about these gentlemen saying it has not been done: that has not anything to do with it at all. We said that water gas could not be made successfully; but it is. You said electric light would not be successful; and it

is. It is not reasonable to say that fuel gas will not be successful, because I believe it will; and, therefore, instead of doing anything or saying anything for the purpose of preventing further experiments I believe every gas man ought to learn all he can to help try and bring it about if possible. If it is possible to make fuel gas in connection with our gas works, which will make more money for us, we want to do it. Let us investigate it.

On motion of Mr. Jenkins, a vote of thanks was tendered to Mr. Mitchell for his paper.

The Association then adjourned to Thursday, May 19, at 9:30 A.M.

SECOND DAY—MAY 19—MORNING SESSION.

The Association was called to order at 9:30 A.M., Thursday, May 19.

ROLL CALL.

The Secretary called the roll, the following members answering to their names:

Honorary Members.

Thomas, Jos. R., New York City.
Slater, A. B., Providence, R. I.
Harbison, Jno. P., Hartford, Conn.
White, Wm. H., New York City.
Humphreys, C. J. R., Lawrence, Mass.
Leach, Henry B., Taunton, Mass.
Barker, Forrest E., Boston, Mass.

Active Members.

Bauer, P., Boonville, Mo.
Baxter, I., Detroit, Mich.
Blodget, C. W., Brooklyn, N. Y.
Bolcom, H. C., Winona, Minn.
Brown, W. L., Evanston, Ills.
Butterworth, I., Columbus, O.
Byron, T., Birmingham, Ala.
Canby, R. H., Bellefontaine, O.
Chollar, B. E., St. Louis, Mo.
Clark, W., Philadelphia, Pa.
Coverdale, R. T., Cincinnati, O.
Cowdery, E. G., Milwaukee, Wis.
Croul, J., Detroit, Mich.
Darrah, S. M., Wheeling, W. Va.
Davis, D., Iowa City, Iowa.
Dickey, R. R., Dayton, O.
Doan, F. M., Jacksonville, Ills.
Douglas, H. W., Ann Arbor, Mich.
Dunbar, J. W., New Albany, Ind.
Eaton, W. M., Jackson, Mich.
Egner, F., New York City.
Evans, C. H., Chicago, Ills.
Faben, C. R., Jr., Toledo, O.
Forbes, J., Chattanooga, Tenn.
Freese, F. W., Laporte, Ind.
Gwynn, J., Steubenville, O.
Harper, G. H., Kansas City, Mo.
Howard, J. B., Galena, Ills.
Hyde, H. H., East Saginaw, Mich.
Jenkins, E. H., Columbus, Ga.
Johnston, W. J., Fort Smith, Ark.
Knight, C. S., Fort Wayne, Ind.
Lansden, T. G., Washington, D.C.
Littleton, A. W., Quincy, Ills.
Lynn, J. T., Memphis, Tenn.
Merrill, H., Janesville, Wis.
Miller, A. S., Omaha, Neb.
Miller, C. R., Marquette, Mich.
Montgomery, J., Sedalia, Mo.
Morgans, W. H., Pontiac, Mich.
Murdock, J. W., Ottawa, Ills.
Odiorne, W. H., Springfield, Ills.
Penn, J., Washington C.H., O.
Perkins, B. W., South Bend, Ind.
Powell, C. S., Richmond, Ky.
Printz, E., Zanesville, O.
Ramsdell, G. G., Phila., Pa.
Raynor, C. H., Adrian, Mich.
Rodgers, J. F., Decatur, Ala.
Rowe, J. J., Cairo, Ills.
Sellers, W. B., Covington, Ky.
Shelton, F. H., Chicago, Ills.
Smedberg, J. R., Chicago, Ills.
Somerville, J., Indianapolis, Ind.
Stanberry, F. H., Pekin, Ills.
Starr, J. M., Richmond, Ind.
Steinwedell, W., Quincy, Ills.
Stratton, J. W., Valparaiso, Ind.
Tayler, G. H., Warren, O.
Thompson, G. T., St. Louis, Mo.
Tracy, W., Alton, Ills.
Walbridge, H. D., Grand Rapids, Mich.
Warmington, D. R., Cleveland, O.
Whipple, H. S., Rockford, Ills.
Wilkiemeyer, H., Evansville, Ind.
Williamson, J., Chicago, Ills.

Associate Members.

Adams, C. F., Buffalo, N. Y.
Bissell, W. G., Chicago, Ills.
Bredel, F., Milwaukee, Wis.
Buss, J., New York City.
Cressler, A. D., Fort Wayne, Ind.
Dell, J., St. Louis, Mo.
Dickey, C. H., Baltimore, Md.
Graeff, G. W., Phila., Pa.
Gribbel, J., New York City.
Guldlin, O. N., Fort Wayne, Ind.
Harper, H. D., Chicago, Ills.
Harris, J. A., Phila., Pa.
Hauk, C. D., Chicago, Ills.
Hayward, S. F., New York City.
Helme, W. E., Phila., Pa.
Higgins, C. M., New York City.
Hubbard, H. M., Chicago, Ills.
Logan, Wm. J., Brooklyn, N. Y.
McDonald, Wm., Albany, N. Y.
McIlhenny, J., Phila., Pa.
Morrell, E. E., Chicago, Ills.
Moses, F. D., Chicago, Ills.
Newman, C. V., Chicago, Ills.
Osius, G., Detroit, Mich.
Persons, F. R., New York City.
Prentice, A. T., Chicago, Ills.
Randle, C. H., Chicago, Ills.
Ranshaw, H., Cincinnati, O.
Reed, C. A., Chicago, Ills.
Roots, D. T., Connersville, Ind.
Roper, G. D., Rockford, Ills.
Russell, D. R., St. Louis, Mo.
Smallwood, J. B., Baltimore, Md.
Stout, J., Chicago, Ills.
Stratton, S. S., Chicago, Ills.
Van Wie, P. G., Chicago, Ills.
Weber, O. B., New York City.

ELECTION OF NEW MEMBERS.

The President—The next thing in order is the report of the Committee on Applications for Membership.

The Committee submitted the following report:

To the Western Gas Association—Gentlemen: Your Committee have received applications for membership from the following named gentlemen, all duly indorsed by two members of the Association, and accompanied by the requisite initiation fee. We find them all to be eligible for membership, and accordingly recommend their election.

Active.

Beal, Wm. R., New York, N. Y.
Bivings, F. L., Birmingham, Ala.
Branch, A. H., Denver, Col.
Byrne, F. P., Detroit, Mich.
Calhoun, Robert, Bay City, Mich.
Christie, W. H., Corning, N. Y.
Copley, I. C., Aurora, Ills.
Corscot, John, Madison, Wis.
Elwood, Jas. G., Joliet, Ills.
Faux, J. A., Pittsburgh, Pa.
Highlands, S. M., Clinton, Ia.
Humphreys, Alex. C., Phila., Pa.
Lukins, W. H., Streator, Ills.
McKay, Wm. E., Boston, Mass.
Rodgers, John, Racine, Wis.
Stedman, Wm. A., St. Louis, Mo.
Stiles, A. K., Chicago, Ills.
Walker, Jos., Port Huron, Mich.
Williams, Wm., Sarnia, Ontario.
Woods, Geo. E., New York, N. Y.
Young, John, Allegheny, Pa.
Young, Peter, Knoxville, Tenn.
Young, Robert, Allegheny, Pa.
Young, Robert, Jr., Detroit, Mich.

Associate.

Felt, Henry, Jr., Cincinnati, O.
Kendall, J. R., Terre Haute, Ind.
Milsted, Wm. N., New York, N.Y.
Morava, W., Chicago, Ills.
Taber, Robert, B., Boston, Mass.
Waugh, F. K., Chicago, Ills.
Whiting, J. H., Detroit, Mich.
Wickham, Leigh, St. Louis, Mo.

The membership of Wm. McDonald was changed from the "Associate" to the "Active" class.

On motion of Mr. Jenkins the Secretary was instructed to cast the ballot of the Association for the names contained in the report. The Secretary cast the ballot and so reported, whereupon the new members were introduced to the Association.

REPORT OF THE BOARD OF DIRECTORS.

The report of the Board of Directors was read:

DETROIT, MICH., May 17, 1892.

A regular annual meeting of the Board of Directors of the Western Gas Association, was held this morning, at 10 o'clock, at which were present the following members: E. G. Cowdery, B. E. Chollar, E. H. Jenkins, I. C. Baxter, A. S. Miller, W. H. Odiorne, A. W. Littleton.

On motion of Mr. Jenkins, the reading of the minutes of the last meeting was dispensed with.

The Board formally examined the following papers, which had been prepared for presentation at the forthcoming meeting, and unanimously approved the same, recommending that they be submitted to the Association for reading and discussion:

1. Petroleum Products—Hydrocarbons Employed in Gas Manufacture, by C. M. Higgins.
2. Some New Features in the Routine Office Work of Small Gas Companies, by W. L. Brown.
3. Everyday Gas Analysis, by W. A. Stedman, Jr.
4. The Construction and Operation of Half-Depth Regenerative Furnaces for Firing with Cheap Coal. by W. H. Odiorne.
5. Fuel Gas as Viewed Through a Coal Gas Man's Spectacles, by K. M. Mitchell.
6. Practical Photometry Simplified for Daily Use, by B. E. Chollar.
7. The Advantages of Recuperative Furnaces in the Utilization of Heat, by F. Bredel.
8. Origin of Coal and Petroleum, by A. E. Forstall.

On motion of Mr. Chollar, it was carried that a committee of five be appointed by the President, whose duty it shall be to revise the by-laws of this Association, and report the results of their labors on the occasion of its next annual meeting.

On motion of Mr. Baxter, it was duly carried that the hours for conducting the business sessions of the Association during the Detroit meeting be from 9:30 to 12 o'clock in the morning; and from 1:30 to 5 in the afternoon.

The Secretary stated that he had recently purchased 50 Western Gas Association badges from the manufacturer, at an expense of $3.50 each, the actual cost of the same being 25 cents in excess of the former price, whereupon it was moved, seconded and carried that the price of $3.50 each be fixed for membership badges, instead of $3.25 as heretofore.

In accordance with the requirements of Section 2, Article VII., of the by-laws, the Board appointed the following Finance Committee, from its own members, to examine the report of the Secretary and Treasurer,

audit his accounts and report thereon to the Association: Messrs. A. S. Miller, W. H. Odiorne and I. S. Post, who have submitted the following as the results of their investigations:

Receipts.

Membership fees	$155 00
Annual dues	803 00
Sale of Badges	78 00
Balance, from May 1, 1891	196 91
Total	$1,232 91

Disbursements.

By Secretary's salary	$400 00	
" sundry bills, as per vouchers	596 45	
" balance, cash on hand, May 1, 1892	236 46	
		$1,232 91

No further business appearing, the Board here adjourned.

A. W. Littleton, Secretary.

On motion of Mr. Ramsdell the report was accepted and the Secretary was instructed to spread the same on the minutes.

Report of Committee on Place of Meeting.

The President—The next business in order is the report of the Committee on Place of Meeting.

Mr. Chollar—Mr. President, the Committee to whom was referred the arduous duty of selecting Chicago for the next annual meeting is unanimously in favor of that place for our next meeting.

On motion of Mr. Starr the report of the Committee was accepted.

Report of Committee on Nominations.

The President—Is the Committee on Nominations ready to report?

Mr. Lansden—Mr. President and gentlemen, I beg leave to report the following nominations:

President—Byron E. Chollar, St. Louis, Mo.
First Vice-President—E. H. Jenkins, Columbus, Ga.
Second Vice-President—I. C. Baxter, Detroit, Mich.
Secretary and Treasurer—A. W. Littleton, Quincy, Ills.
Directors—F. M. Doan, J. M. Starr, W. L. Brown, D. Davis, R. R. Dickey, Jas. Montgomery, J. T. Lynn, J. W. Dunbar and H. D. Walbridge.

Election of Officers.

On motion of Mr. Odiorne the report was accepted, and the Chairman of the Committee was instructed to cast the ballot of the Association for the election to office of the gentlemen named.

Report of Committee on President's Address.

The President—The next business in order is the report of the Committee on President's Address.

Mr. Ramsdell, of the Committee, submitted the following report:

To the Western Gas Association: Gentlemen—Your Committee to whom was referred the President's Address beg leave to present the following report:

The address, as a whole, is of unusual interest to members of this Association, and we cordially advise a careful reading. Among its many valuable suggestions we call particular attention to the following:

1st. We cordially approve of all that is said concerning the importance of gas companies being represented at these meetings.

2d. In regard to the suggestion of holding two annual meetings, we deem this subject of too great importance to decide during the brief time at the disposal of this Committee, and recommend it be referred to a Committee of five, to consider and make report to our next meeting.

3d. We fully approve of that portion of the address referring to the subject of entertainment.

4th. While we doubt the wisdom of changing the time and place of annual meetings, unless conspicuously necessary, we would recommend that the Board of Directors be clothed with power to make such change, if by them deemed for the best interests of the Association.

5th. We most fully indorse that portion of the address relating to municipal control, and recommend a careful perusal of this portion of the address by the members.

6th. We particularly call the attention of the fraternity to the remarks made upon the subject of gas for fuel, and to the strong arguments presented in the remarkable success and practical results of this feature of the gas business as shown, and would emphasize the marked increase following low prices. We recommend a careful study of the "law of cause and effect," as contained in the figures given.

7th. We fully concur in the argument advanced regarding successful competition with electric light through the means of high candle power.

8th. Referring to that portion of the address touching the uniformity of special castings, as adopted by the Society of Gas Lighting, of New York, we recommend the adoption of a resolution adopting the same standards; and also suggest a resolution of thanks to the Committee of the the Society of Gas Lighting who have so faithfully executed the work.

Respectfully submitted,

G. G. Ramsdell,
Jas. Somerville,
Walton Clark.

The President—What is your pleasure with this report, gentlemen?

Mr. Jenkins—I move that it be received.

Mr. Lansden—I would like to suggest, and I will put it in the form of an amendment to that report, that 500 copies be printed and the Secretary instructed to send a copy to each member of the Association.

The President—I hardly think that is necessary.

Mr. Ramsdell—That was talked over by the Committee, but at one of our meetings—I think two years ago, if I remember aright—this same subject came up and it was decided not to do that hereafter. The address is published in the Gas Light Journal, and, as it is read in that form, it seems to be a useless expense. It was for that reason that the Committee did not recommend it.

Mr. Smedberg—I would like to suggest that our personal records of the proceedings of the Association will be entirely incomplete unless so valuable a paper as that appears among them, and I think that the question of expense should not stand in the way for one moment. I know, to complete my own files, I would very much prefer personally to have that paper among them. Those are simply my own personal views of it.

Mr. Ramsdell—I do not want it to be understood that the Committee in any way undervalued the importance of this paper. As a matter of fact the Committee were unanimously of the opinion that it was one of the best presidential addresses we had ever had; but a precedent had been formed, and for that reason we thought it best not to break the rule so adopted.

The President—If I am correctly informed the statement of the finances of the Association will hardly permit expenditures that are not absolutely necessary. I think myself that the precedent had better be followed.

Mr. Smedberg—May I ask one question? Will not that same objection hold good with every paper that has been read before our Association. To my mind, the paper is of importance; it is full of instruction, and it is as valuable to any of us as gas men as any purely technical paper. I think we can better do without the printing of every other paper rather than omit the printing of this.

Mr. Jenkins—It is not intended to exclude the President's address from our list of papers. It would be impossible to get that in among this list for this year. It would be published with the entire proceedings in the American Gas Light Journal and so filed away. I doubt if very many of the members will take this and file it away, but they will file away the American Gas Light Journal. While I should be very much pleased to see the address published and sent out and utilized by our boards of directors, yet I think I agree with the Committee that it is more money than we can afford to spend at this time.

The President—The original motion is the acceptance of this report. Those in favor of its acceptance—

Mr. Lansden—I wish to ask right here whether or not my amendment does not come before the original motion.

The President—Mr. Lansden's motion I think was not seconded.

Mr. Lansden—It was seconded. I made it as an amendment to the report.

The President—Please state the amendment again.

Mr. Lansden—It was an amendment to the report, as I intended to offer it, that 500 copies of the President's address be printed and a copy sent to each member. It was for that very reason that I wanted to get it before the Directors of several companies, and in that way let them see it. I know that each Superintendent would refer it to the Directors.

The President—I will put Mr. Lansden's motion as an amendment to the original motion, that 500 copies of this report be printed and distributed. Those in favor of the motion, and I hope they will not be many, will please stand up. (The amendment was carried, as was also the original motion.)

The President—The report of the Board of Directors recommends that a committee of five be appointed to consider a revision of the by-laws, to report at the next annual meeting. How do you want that committee appointed?

On motion, the President appointed the following committee to revise the by-laws, in accordance with the recommendation of the Board of Directors: Messrs. A. W. Littleton, George G. Ramsdell, B. E. Chollar, E. H. Jenkins and James Somerville.

RESPONSES FROM OFFICERS-ELECT.

Mr. Howard—I think we would all like to hear from our newly-elected President, Mr. Chollar.

Mr. Chollar—Mr. President and Gentlemen of the Convention: I fully appreciate the honor that you have conferred upon me in electing me President of the Association. I have sympathy for the Association in their impending calamity. In anticipation of some such action as this I had requested the President to appoint me chairman of the committee, but he did not see fit to do so, and appointed a kind of scrub committee (laughter); but I accept the situation, and entreat every member of the Association to stand by me, and that every man shall be at Chicago to help me out of the scrape.

The President—If there are any of the other newly-elected officers who would like to make a speech we will be glad to hear from them. (Cries of "Jenkins.")

Mr. Jenkins—I will simply say to you that I thank the Association for the honor conferred.

Mr. Baxter—Mr. President and Gentlemen of the Association: I must thank you for this unexpected honor, and assure you that I will try to fill the position to the best of my ability.

Mr. Littleton—I will make my speech about as short as possible. I thank you for the honor conferred, and I will continue to do in the future as I have in the past—to try and fill the position to the best of my ability.

[To be continued.]

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

ONE of the bright young men of the Cincinnati *Enquirer* has made the following important discoveries in the realms of gas manufacture, which we hasten to put before our readers lest they, in the meantime, be deluded into purchasing the right to operate under some of the lesser forms of apparatus—such, for instance, as are said to produce 500-candle feet from an ounce of coal and a gill of oil—and a gale of wind. The *Enquirer* youth's yarn is about like this: "A German inventor has devised a means of producing a light superior in strength to either oil or electricity. It is by means of air driven through pumice stone—the latter being impregnated with benzine. The benzine gas thus obtained is then carried through a fine magnesium powder, and proceeds upward through a pipe to be consumed in a small flame of a claimed 400,000-candle power. The apparatus for producing the light consists of a blast engine for driving the air through the pumice, and a number of other accessories, all of which take up but a small space, and which are inclosed in a glass case for protection from the elements, as the light is especially designed for illumination. The arrangement is especially adapted for giving an intermittent light, the consumption of the magnesium being small depending on the power of the light required." How beautifully simple the explanation is—and how delightfully vague!

MR. JOHN J. ROWE has resigned the Superintendency of the Cairo (Ills.) Gas Light Company, so that he might accept the position of Manager or Superintendent of the Springfield (Mo.) Gas and Electric Light Company.

WE are informed that the negotiations looking to a consolidation of the Passaic (N. J.) Gas Company, and the Passaic Electric Light Company have been suspended. The hitch came upon the decision of the lawyers who had charge of the preliminaries that the State law (passed at the last session of the Legislature) permitting such consolidation was unconstitutional.

THE shining light amongst the Central New York gas companies, who, if course, is none other than Mr. Austin C. Wood, has again convinced his Board of Directors that liberality is the best policy, as will be readily understood from knowledge of the notice given by the Company some days ago. Under this notification we find that, beginning with the first inst., the gas rate to the city is put at $1.20 per 1,000, and to ordinary consumers at $1.30 per 1,000. This is equivalent to an all-round reduction of 10 cents per 1,000 from the old rates, which were as follows: To the city, $1.50 per 1,000, and to the ordinary consumers $1.60 per 1,000, with 20 cents per 1,000 off in both instances, when the accounts were settled within 15 days from the date of the bills. There are only three cities in the State—New York, Buffalo and Brooklyn—that have cheaper gas for illuminating than Syracuse. In New York and Brooklyn, as the result of legislative enactment, the rate is $1.25, while at Buffalo the rate is $1.20. In the meantime, the relative difference in population should be remembered. For instance, according to the last United State's Census, New York city is shown to have 1,515,301 inhabitants; Brooklyn, 806,343; Buffalo, 255,664; and Syracuse, 88,143. Now, even by dividing the population by the number of Companies in each city, the showing made by Syracuse is quite at the top, in respect of the showing for cheap gas, thus proving anew that it is most in line with the obtaining of cheap gas that the supply thereof should be in the control of one Company. Here is the way in which it figures out on that basis:

City.	No. of Companies.	Population.	Average Head to Each Company.
New York	6	1,515,301	252,560
Brooklyn	8	806,343	100,793
Buffalo	3	255,664	85,221
Syracuse	1	88,143	88,143

In the New York example, no calculation is made respecting a seventh Company (the Yonkers), the great bulk of the business of which is done in the city of Yonkers, although it does supply some gas in the extreme northwest part of New York city; nor is any allowance made in the Brooklyn instance for a ninth Company (the King's County), which operates in the extreme southwest line of the city, as the gas used by it is manufactured on the works of the Citizens Company. Although the average per head in Buffalo is a trifle less than that of Syracuse, the disparity is more than made up by the difference in the relative commercial importance of the two cities. Buffalo, standing as it does in the nature of a gateway to the West and Northwest, supports a much larger and varied class of business than does Syracuse, and we imagine that an analysis would show that the average gas consumption per head in Buffalo was considerably larger than a like average at Syracuse. In any event the Salt City has reason to be satisfied with the way her gas consumers are treated by the Gas Company; again, that Mr. Wood is a man of his word.

THE proprietors of the Siemens-Lungren Company have obtained, as the result of a bill in equity, filed in the United States Circuit Court, for the Southern District of New York, in the case entitled, "Siemens-Lungren Company vs. Thomas Gordon," the following order: "*Ordered*, That an injunction *pendente lite* do forthwith issue against the defendant, restraining and enjoining him, as prayed for in the said bill of complaint, to wit:

"From assigning or transferring any right, title or interest whatsoever in and to the said letters patent, to wit: No. 422,587, No. 422,588 and No. 422,589, all dated March 4, 1890, and in and to any and all pending applications for letters patent, or applications about to be made for letters patent, and letters patent that may be granted and issued thereon, and in and to any inventions which he has made or may hereafter make in or on regenerative gas burners or gas lamps in violation of his said assignment of May 20, 1887, and the covenants contained therein, except as ordered by this honorable court."

WE understand that Mr. William H. Hopkins, who has been in treaty for some time for the purchase of the Baraboo (Wis.) Gas and Electric Light Company, has finally obtained control of the property. The holder that was recently wrecked will be rebuilt, and other important betterments on the plant are also underway.

THE Siegmund bill to create and regulate an opposition Company at St. Louis is before the local authorities. The St. Louis *Republic* states that Messrs. John Maguire, Perry Bartholaw and John B. Taylor are interested in the Company.

THE Electric Lighting Company, of Mobile, Ala., seems to be doing quite a business—in the line of stock and bond emissions, as the stockholders have been informed that a meeting will be held, on Wednesday of this week, for the purpose of voting upon a proposition to increase the capital stock in the sum of $100,000, and also to issue a mortgage of $50,000. Can this mean that the Company proposes to buy out the local Gas Company?

IT is proposed to establish a fuel gas plant at Oxford, O.

A CORRESPONDENT, located not far from Peekskill, N. Y., writing to the JOURNAL under date of the 2d inst., says: "Not having seen any mention in the JOURNAL of some rare gas proceedings that recently occurred before Judge Barnard, sitting at Poughkeepsie, N. Y., I thought perhaps your readers would be interested in some details concerning the same. The case was that of the bondholders of the Fishkill and

Matteawan (N. Y.) Gas Company in foreclosure proceedings, the case being heard by Judge Barnard on May 23. The proceedings, of course, were mainly directed against Mr. Robert F. Mullins, the Lessee of the works. Mr. Mullins, by the way, was complainant in a suit for damages against the proprietors of the Company, tried some time ago before Judge Cullen; Mullins' suit being based on the ground that the proprietors, as a bait to induce him to lease the works, made many statements concerning the amount of business done, and as to the physical condition of the plant, which subsequently proved to be very wide of the truth. For instance, they declared a dividend on the stock some weeks before the lease was signed. They claimed to have 90 consumers, and said that on account of repairs that had been made on the main system the leakage, which was 33 per cent., had been cut to 15 per cent. No one can sympathize very greatly, however, with Lessee Mullins, for the proprietors said they had no books to show and that no set accounts had been kept, and Mullins admits that he took their statements for granted. After operating the works for 30 days he found that there was much reason for doubting the richness of the bargain that he entered into. During that month the station meter showed a make of 231,000 cubic feet, the consumers' meters—of which there were only 49 instead of the promised 90—when the statements were taken, showed a sale of only 99,000 cubic feet. The difference—only 132,000 cubic feet—was filtered through the rents in the mains and the fissures in the rocky roads that enable the inhabitants of the district to amble through the mountains of Fishkill and Matteawan. The proprietors of the Company may have declared a dividend on the stock, but Mr. Mullins was confronted with the cold fact that a coal bill amounting to $1,900 was unpaid. Mr. Mullins presented other equally depressing testimony, which I presume was taken under advisement by Judge Cullen, who, I believe, awarded damages to Mr. Mullins, but in what amount I am unable to state. On the occasion of the foreclosure proceedings before Judge Barnard, testimony in substance like that given before Judge Cullen was submitted by Mr. Mullins, whereupon the opposing attorney 'crammed' himself full of gas lore, with an astonishing result. He argued that the difference between 231,000 cubic feet and 99,000 cubic feet was merely the effect of 'natual shrinkage,' and that almost every gas company in the country was similarly affected—or afflicted. Counsel also made an ingenious plea respecting the 'shrinkage' of consumers, and descanted eloquently upon the uncertainty of keeping track of a floating debt, without the aid of books. The attorney was successful in his pleadings, for Judge Barnard concluded that the stated difference between sendout and accounted-for gas was 'not so much after all;' that difference between 90 consumers and 49 consumers was 'very little'—that when they made that statement they 'might have been mistaken,' and meant no fraud; and that the $1,900 due for coal was 'but a trifle, which they might have been able to pay from the proceeds had they continued to operate the plant.' Judge Barnard closed his finding by ordering the filing of a decree of foreclosure; so it is exit, Mullins; enter, the original proprietors. The story has one moral—gas men ought to keep clear of the calendar on the days that Judge Barnard is listed to 'sit.'"

We regret to report the death of the Hon. Thos. R. Brown, who passed away at Keyport, N. J., on the morning of the 4th inst. Mr. Brown, who was of Scotch parentage, was born in South Amboy, N. J., in 1823, and removed to Keyport in 1846, where he resided continuously up to his death. He was one of the originators of the Mattawan and Keyport Gas Light Company, and was its President for many years. He was prominent in the commercial life of Monmouth county, and represented that county in the State Senate during the last session of the Legislature.

The Poughkeepsie (N. Y.) Gas Light Company has opened a very spacious and handsomely arranged office and show room, at No. 35 Market street, which is directly opposite the Nelson House, and in the very heart of the business center of the city. An imposing stock of gas cookers, heaters, etc., is tastefully displayed, on raised platforms, along the sides of the room, and the urbane Mr. Tracy, assisted by a decidedly attractive representative of the gentler sex, are ever ready to explain all about cooking and heating by gas to the householders of the center of Dutchess county. Nor have their efforts been in vain, as will be understood when it is said that 410 cookers and heaters are now on the Company's mains. Two years ago the number in use was less than a score; and the present standing in this respect ought to give satisfaction to the Poughkeepsie trio—Messrs. Young, Atwater and Tracy. Gas is sold for fuel purposes at the rate of $1 per 1,000, and the Company sells the stoves at net cost.

It is probable that the works of the Hanover (N. H.) Gas Company will be shut down, should the authorities determine to light the streets by electricity, which now seems probable. The Company has been an unprofitable one to the proprietors, and no return in the shape of dividends has ever been made. An oil gas, of 70-candle power, is supplied, and the selling rate is $10 per 1,000. The works were built in 1873.

The plant of the Pittsfield (Mass.) Gas Company is to be bettered by the placing of a new set of purifiers, a new station meter and an exhauster.

We regret to have to chronicle the death, on the morning of June 5, of Mr. Stephen H. Whidden, for many years the respected President of the East Boston Gas Company. Deceased was a member of the firm of A. G. & S. H. Whidden, and was also President of the First Ward National Bank. Interment was made on the afternoon of last Wednesday. We hope in due time to be able to place before our readers some extended account of his life.

The third largest taxpayer on the assessment rolls of Concord, N. H., is the Concord Gas Light Company, which contributed this year the sum of $2,315 to the city treasury.

The contest over the public lighting at Sing Sing, N. Y., has been settled. The local electric light company will light the northern portion of the village with arc lamps, while the Sing Sing Gas Light Company will take care of the south side lighting district by means of gas lamps. The result is practically a victory for the Gas Company.

The Providence (R. I.) Gas Company will run a new 6-inch main from Park square to Blockinton's bridge.

The holder station at Milburn, N. J., from whence the surrounding towns in the Orange hills are supplied with gas, will be completed in less than a month.

The Home Gas Machine Company, the headquarters of which are at No. 114 State street, Boston, Mass., will wind up its affairs. It is insolvent.

Some "option hunters" on valuable gas works properties in this vicinity recently conceived the idea that they could secure the two gas plants at Newark, N. J., at a bargain, and turn the "bargain" over at a neat profit. The poor men evidently "didn't know, you know," who they were dealing with, out Newark way; but they know better now. The "eminent financier" in the option line is almost a thing of the past. 'Tis better so.

The Board of Gas and Electric Light Commissioners have been appealed to by some of the gas consumers of East Boston to investigate the conditions of the gas supply of the district with a view to ordering a reduction in the gas rate.

The Cincinnati *Enquirer*, of the 2d inst., said: "The Committee on Light and Law Contracts of the Board of Legislation met in joint session yesterday afternoon to consider the gas ordinance calling for a uniform rate of 85 cents per 1,000 cubic feet for gas. Mr. Dienst presided, and a general discussion of the matter was had. Mr. Dienst explained to the joint body that the city entered into a contract with the Gas Company in the year 1887. The time of the contract was 10 years, and for that period the Gas Company agreed to furnish gas to private consumers at the rate of $1.25 per 1,000 feet. This contract has five years more to run, so that if the Gas Company should be brought to charging less for its gas the reduction would be in the way of a concession. Mr. Dienst proposed that a committee be appointed to confer with the Gas Company on the subject to see what it was willing to do in the matter. This was agreed to, and the following members conferred yesterday afternoon with General Hickenlooper: Messrs. Dienst, Baer, Sweeney, Juergens and McRoberts. These gentlemen were in close consultation with General Hickenlooper for an hour. The latter explained that the present price of gas is $1.25 gross and $1.15 net, and that the Company is willing to reduce these figures to $1.10 gross and $1 net. The committee noted this as the result of the conference, and will report it to the joint committee, who will then report to the Board of Legislation."

The 34th Annual Meeting of the Port Hope (Can.) Gas Company was held on the 26th of May. We are indebted to "J. S." for a report of the proceedings, from which we make the following extracts. President Smart, on behalf of the Directors, in opening the order of business, said: "Your Directors, in presenting this their 34th annual report and the yearly profit and loss account, duly audited, are much pleased to be

able again to report an increased output during the past year, and that our sales of coke and tar are also satisfactory, which has enabled your Directors, after payment of the extra outlay to the Government for reinspection of our meters, to declare a dividend of 4½ per cent. on the capital stock of the Company. Our gas during the year, as certified by the Government Inspector, has exceeded by 12½ per cent. the candle power required by statute, and without a trace of impurity, clearly proving beyond a doubt that our customers have had an A1 gas service; which certainly ought to be, and so far as we know is, highly satisfactory to them. All this, however, has largely been brought about by the care, industry and vigilance of the officers and employees of the Company, and the efficient plumbing of Messrs. Dunn & Co., who have done us good service in the improvement of our connections and customers' service. Our sales of summer fuel continue to grow, but as its advantages become better known it will doubtless increase with greater rapidity. In the cities, kitchens are being heated from the furnace, and gas only used for fuel in cooking, which can now be done at about the same cost as with coal, and that without delay, dirt, or coal or ash labor. Your Directors are more and more convinced that gas after all is the 'light of the present;' as to the 'light of the future,' the next generation may be left to deal with that—our time is fully occupied with present requirements."

In moving the adoption of the report President Smart, among other things, said: "The result of our last year's business must be, under the circumstances, considered satisfactory, as a few years ago, when electric lighting was installed, many of our shareholders thought that our business would suffer thereby, and some of our 'City Fathers' scarcely thought the town's large interest in the stock of the Gas Company worthy of any consideration. It is now 5 years since you elected me your President and appointed me Managing Director. Then our sales to private consumers were 1,888,900 feet: to the corporation, for street lighting, 393,000 feet; total, 2,281,900 feet. During the past year we have sold to private consumers 2,519,100 feet, and to the corporation for street lighting 17,500; total, 2,536,600 feet. But for the fact that the street lighting has been given to our rival, our business, even at the largely reduced price, would now pay a fair return; whilst the change, I regret to say, has lessened our dividends and largely increased the tax for street lighting. Some of our customers have thought that we ought to contract per month or year for our light. To such there are serious objections."

The report was adopted and a vote of thanks was passed to the Directors. The retiring Board was then re-elected, and they subsequently organized by electing Mr. John Smart President and Managing Director.

THE "managing man" of the Peoples Gas Light Company, of Cleveland, O., will have his time fully occupied this summer, for the proprietors have authorized the making of a contract with Mr. Fred. Bredel, under which the manufacturing plant will be not only completely renewed, but its plan greatly enlarged. The contract includes 10 benches of 9's, to be fired on the Kloenne-Bredel full depth recuperative system. The stack range will be 65 feet 6 inches long, by 21 feet in width, and the iron charging floor will be 11 feet above the basement floor; a new purifying house is to be put up, which will contain a complete purifying apparatus of the Bredel type (illustrated in the JOURNAL, February 8th, 1892, p. 186). The machine consists of one air condenser, 10 feet 6 inches in diameter, and 20 feet in height, with 7 tubes of 24 inches diameter, provision being also made to put in an apparatus equal to the one installed when the production of the works demands the addition—or a make in excess of 1,000,000 cubic feet. Then follow in sequence two Kloenne-Bredel washers, each of 10 feet diameter, and with 5 compartments. Then follow one multitubular compensator and another washer, also of 10 feet diameter, with the necessary ammonia pump and separator. The house is also arranged for two 20-inch Roots exhausters. All connections will be above ground, and the house is to be two stories in height. The gas connections are to be 20 inches in diameter. The Company will install a new set of purifiers, to use oxide as the cleansing material; also, a new station meter.

PROF. CARHART, of the State University, was recently employed to test the illuminating value of the 2,000-candle power arcs that were being supplied on public account at Grand Rapids, Mich. He finds that the average lighting value is less than 1,000 candles.

THE Massachusetts Board of Gas and Electric Light Commissioners have decided against the petition of the organizers of the Consumers Gas and Electric Light Company, of New Bedford, Mass., for the right to manufacture and distribute gas in that city. The Commissioners are "unable to see any advantage to the residents by granting the prayer of the petitioners," and they are to be congratulated on the clearness of their vision. Exit, the corn cob and potato juice gas.

A MOVEMENT is underway to consolidate the local gas and electric light interests of Kansas City, Mo. In fact, the articles incorporating the Kansas City Gas and Electric Company have been prepared. They are signed by G. H. Nettleton, J. S. Chick, E. H. Allen, S. B. Armour, M. J. Payne, E. L. Martin, George Kumpf, E. R. Weeks, Randal Morgan and S. T. Bodine.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

Mr. Allen Hopes that "F." will Follow It up.

POUGHKEEPSIE, N. Y., June 6th, 1892.

To the Editor AMERICAN GAS LIGHT JOURNAL:

In reply to "F." of Columbus, Ga., I desire to say that Dr. Gesner, in his work on coal and petroleum, states: "It is very singular that, with the ordinary process for making illuminating gas from coals, we never obtain any rich gas, whether the yield be large or small. I am certain that the system is radically wrong." I think that I might be allowed once in a while to refer to science and chemistry when writing on the subject of the manufacture of gas.

But "F." commences wrong in criticising my letter. In the first place, 2,240 lbs. of coal per ton is generally admitted, instead of 2,000 pounds.

Second—I gave figures per *volume* of gas; but he gives figures per *weight*, assuming 0.4, as the "specific gravity." I do not think that he obtained this from "Science and Chemistry." It is probably a low *estimate* of the specific gravity of ordinary commercial gas, which is probably doubled in specific gravity by different combinations and impurities—the *weight* differing much more, and, therefore, much more difficult to ascertain, than by *volume*. Dr. Lewis M. Norton, of the Mass. Institute of Technology, in one of his lectures on the subject of gas, said, "The diluents constitute the greater part of the volume of gas" * * * "I think that the analysis of gas by the State Inspector of Massachusetts, so far as they are confined to coal gas, very seldom shows above 6.5 per cent. of illuminants." * * * "Most of the chemists who have had to deal with the question of gas analysis have confined their attention *solely* to this one subject—the *estimation* of the *volume*. That is due to several reasons. The problem is one of great difficulty." "F." will have to go further than he has into science and chemistry to find his multiple of 0.4 specific gravity of gas, in order to controvert my statement as to the *volume* of gas per ton of coal.

Third.—The 99,000 cubic feet of gas per volume per ton of coal was not the "Allen theory." I had apparently good authority for the statements; but I thank "F." for the avoirdupois figures which he gives of the possible *weight* of commercial gas per ton of coal, as they show that the true "Allen theory," of 20,000 to 30,000 cubic feet per ton, is largely covered by his figures, which entirely dispense with all "thaumaturgy," or the idea of anything wonderful in my claims.

Fourth.—But to further strengthen the probability of the truth of "F.'s" figures, I will state Allen & Harris have *practically* obtained at the rate of 40,000 cubic feet of 16-candle gas per ton of coal, under the supervision of the late Prof. B. Silliman, of Yale College, with apparatus greatly inferior to our present improved apparatus. And, besides this, Mr. Charles Hunt, M. I. C. E., read a paper before the Gas Institute, at Birmingham, England, in June, 1882, in which he stated that the ordinary gas coals to which he referred contain 65,000 cubic feet per ton (2,240 lbs. per ton per *volume*, usually considered) of 16 candle gas (specific gravity, say, 450.)

I assume that he is reputable authority for what he says, from the fact of his appearing before a literary institute in Birmingham; and his paper was not only published in England, but was deemed of sufficient importance to be published in our own AMERICAN GAS LIGHT JOURNAL, which to me was sufficient evidence of the facts stated, even though the average yield of gas for many years past in England, has not exceeded 9,500 cubic feet per ton of 15-candles, and in this country, of 10,500 cubic feet of 16-candles.

One might naturally think that it was high time that the attention of the gas fraternity was called to the science of gas making. I hope that "F." will follow it up.

A. L. ALLEN.

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MONDAY, JUNE 13, 1892.

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JUNE 13.

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	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	114¼	114⅜
Central	500,000	50	—	90
" Scrip	220,000	—	—	100
Equitable	4,000,000	100	145	150
" Bonds	1,000,000	—	106	108
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	115
Mutual	3,500,000	100	137	140
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern		50	—	—
" Bonds	150,000	—	—	100
Standard Gas Co—				
Common Stock	5,000,000	100	40	45
Preferred	5,000,000	100	91	93
Yonkers		50	112	—
Richmond Co., S. I.	346,000	50	—	—
" Bonds	20,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	134	—
Citizens	1,200,000	20	110	—
" S. F. Bonds	320,000	1000	—	103
Fulton Municipal	3,000,000	100	138½	—
" Bonds	300,000		102	—
Peoples	1,000,000	10	90	—
" Bonds (7's)	368,000	—	100	—
" " (6's)	94,000	—	100	—
Metropolitan	870,000	100	110	—
" Bonds (5's)	70,000	—	100	—
Nassau	1,000,000	25	142	—
" Cts.	700,000	1000	99	100
Williamsburgh	1,000,000	50	127	—
" Bonds	1,000,000	—	107	110
Out of Town Gas Companies.				
Boston United Gas Co.—				
1s Series S.F. Trust	7,000,000	1000	89	89½
2d " " "	3,000,000	1000	78	78½
Bay State Gas Co.—				
Stock	5,000,000	50	60¾	61¼
Income Bonds	2,000,000	1000	86	87
Buffalo Mutual, N. Y.	750,000	100	110	—
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	155	160
Chicago Gas Company.	25,000,000	100	79	79¼
Chicago Gas Light & Coke Co.—				
G't'd Gold Bonds	7,650,000	1000	90½	90⅝
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1000	—	97½
People's Gas and Coke Co., Chicago—				
1st Mortgage	2,100,000	1000	102	—
2d "	2,500,000	1000	101½	—
Consumers Gas Light Co., Jersey City	2,000,000	100	17	22
Bonds	600,000	1000	78	82
Cincinnati G. & C. Co.	7,000,000	100	—	200
Consumers Toronto	1,000,000	50	180	185
Central, S. F., Cal.			90	—
Capital, Sacramento, Cal			58	
Consolidated, Balt.	11,000,000	100	55	55½
" Bonds	6,400,000		107	107½
Citizens Gas Lt. Co., Rochester, N. Y.	500,000	—	85	101
Bonds	250,000		—	—
East River Gas Co., Long Island City	1,000,000	100	100	105
Bonds	500,000	100	100	102
Hartford, Conn	750,000	25	120	128
Jersey City	750,000	20	180	200
Louisville, Ky	2,570,000	50	125	130
Little Falls, N. Y.	50,000	100	—	100
" Bonds	25,000	—	100	103
Laclede Gas Light Co., St. Louis, Mo.—				
Common Stock	7,500,000	100	20	20½
Preferred "	2,500,000	100	61½	62
Bonds	9,034,400	1000	84	84½
Montreal, Canada	2,000,000	100	200	208
Memphis (Tenn.) Gas	750,000	100	40	—
" Bonds.	240,000	100	103	—
New Haven, Conn		25	200	—
Oakland, Cal.			34¾	35¼
Peoples, Jersey City		—	115	125
" " Bonds			—	—
Paterson, N. J.		25	99	102
Rochester, N. Y.		50	99	100
Syracuse, N. Y.	500,000	25	—	—
San Francisco Gas Co. San Francisco, Cal.	10,000,000	100	63	63½
Washington, D. C.	2,000,000	20	200	208
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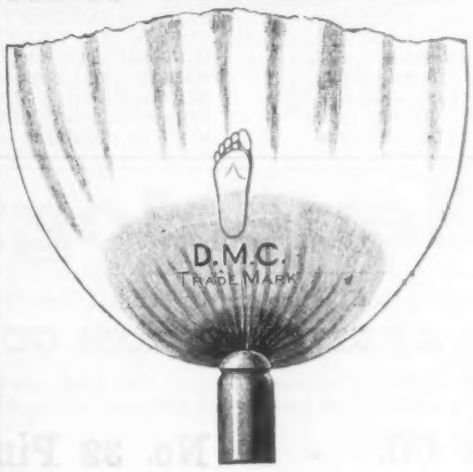

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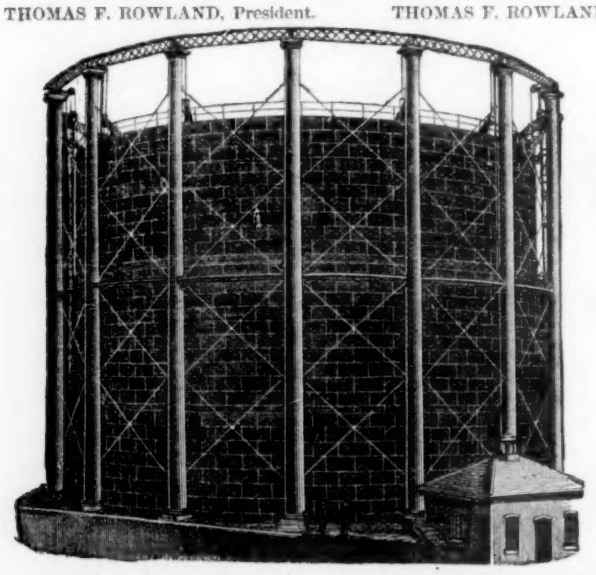

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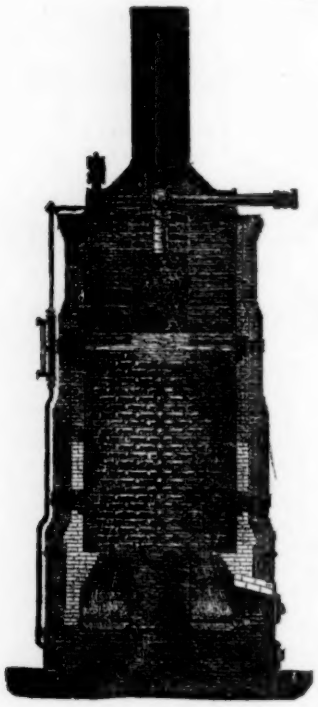

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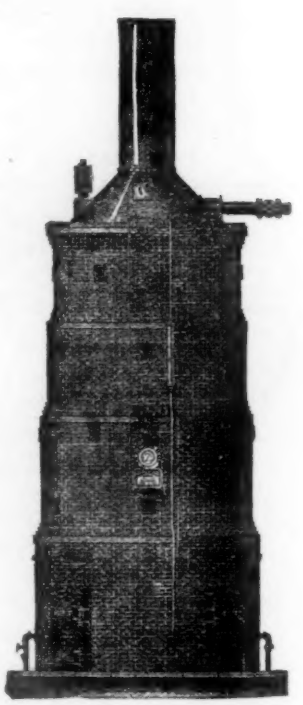

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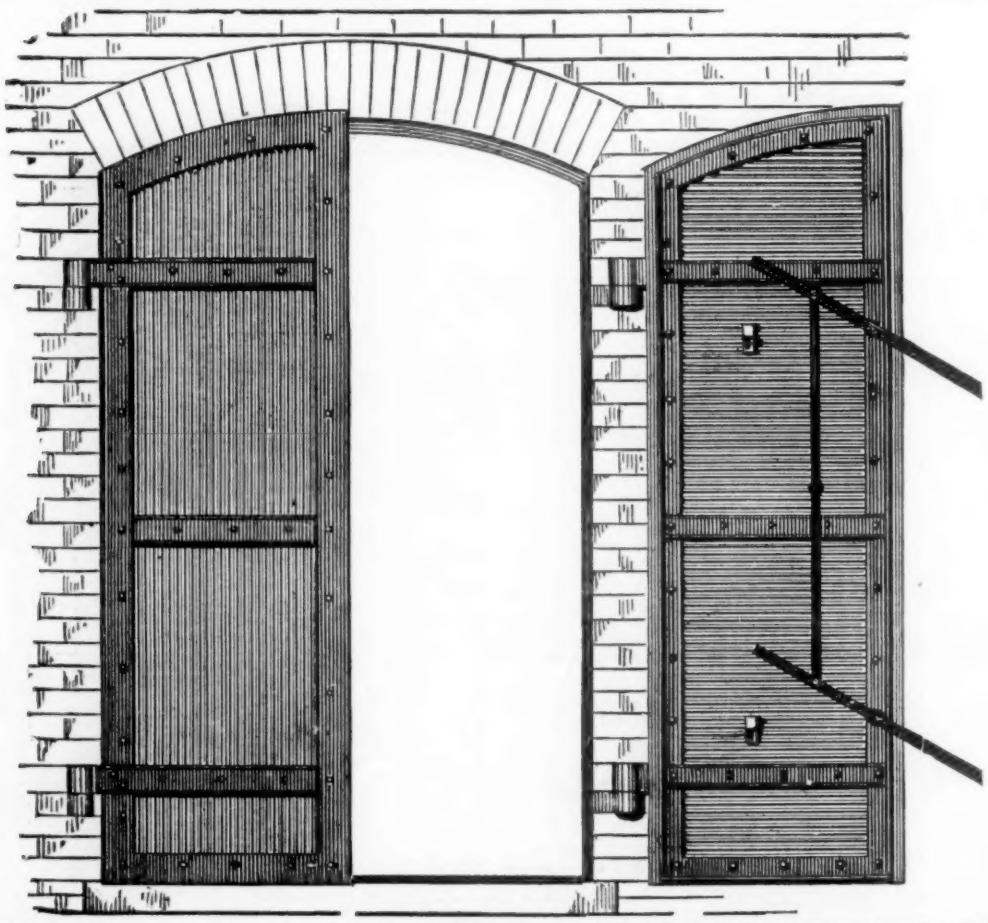

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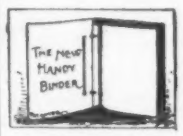

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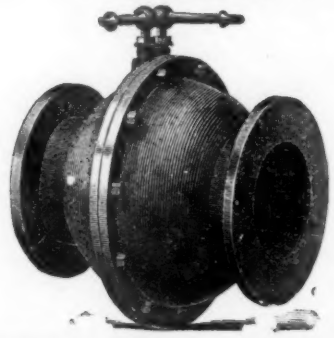

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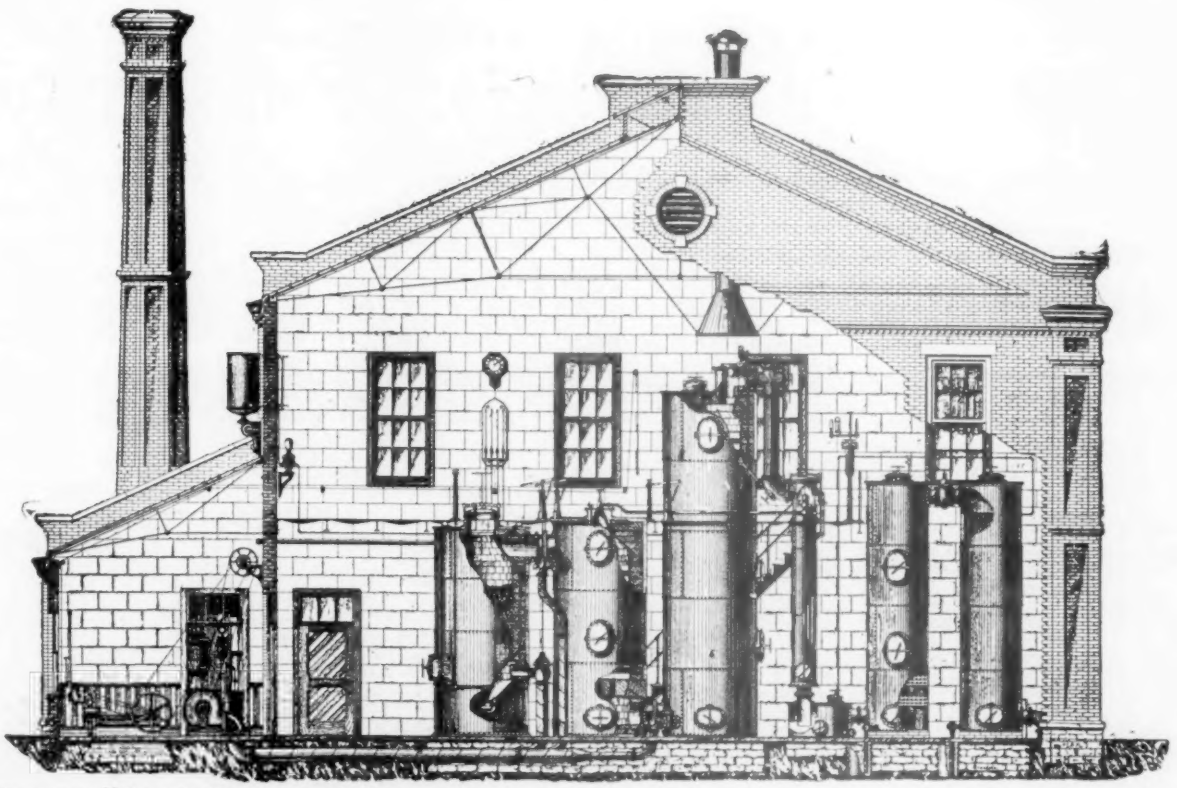

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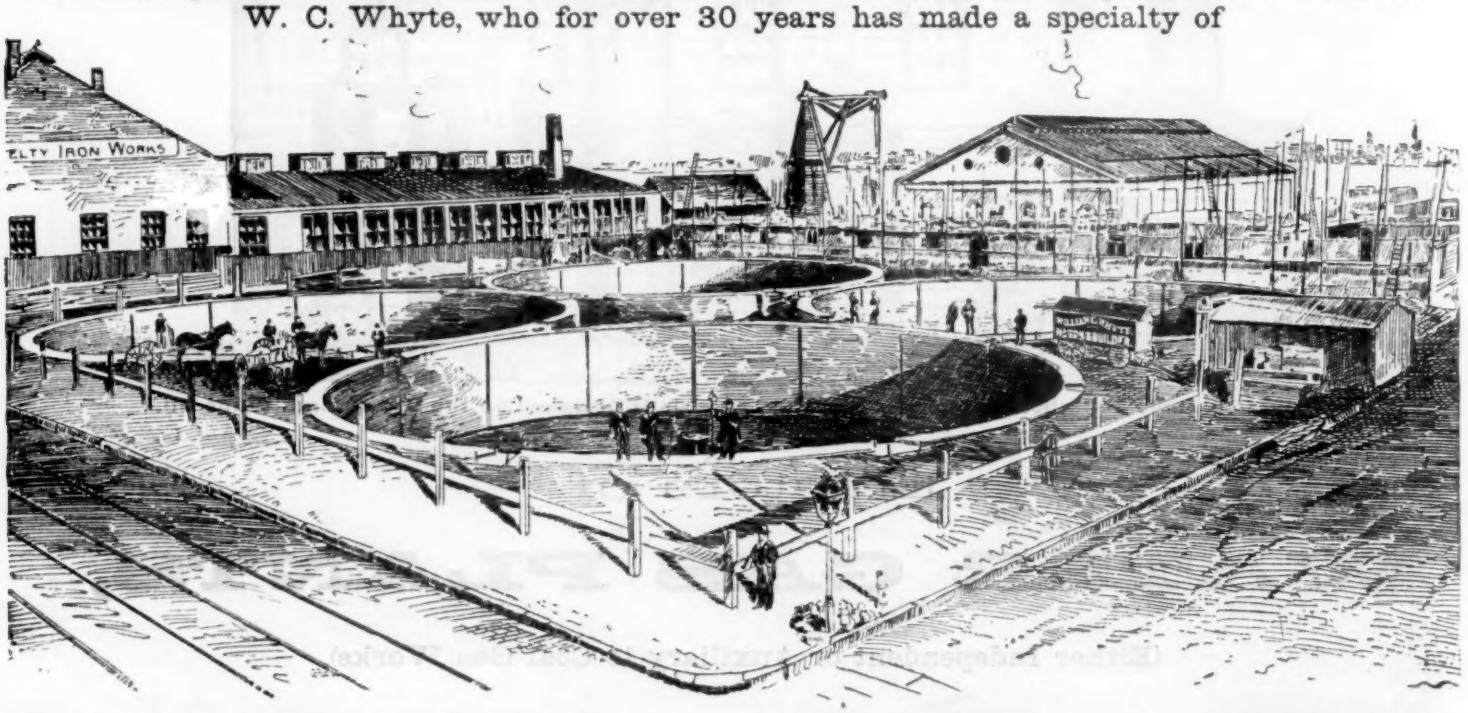

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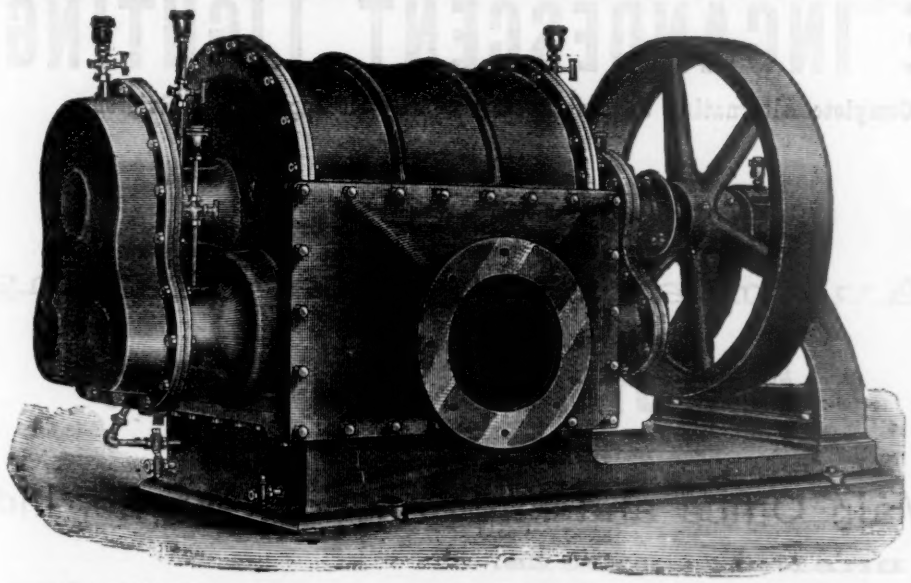

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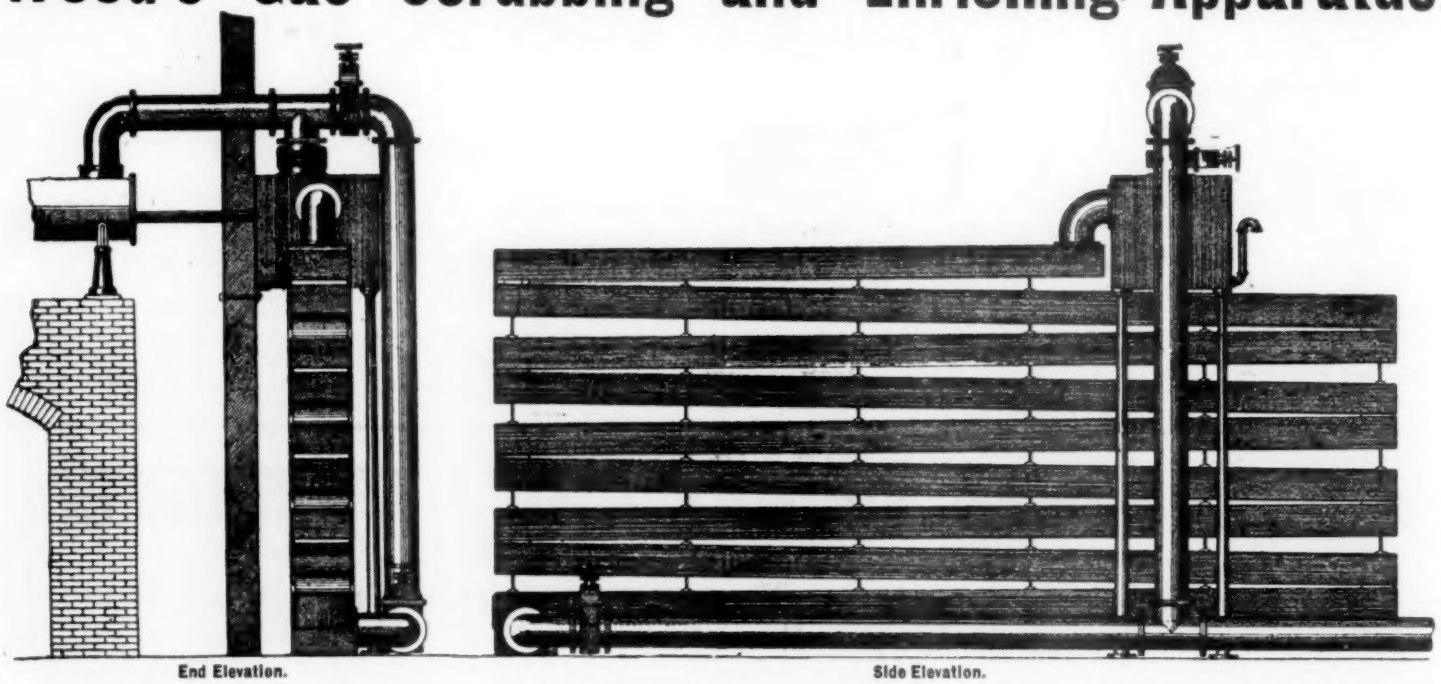

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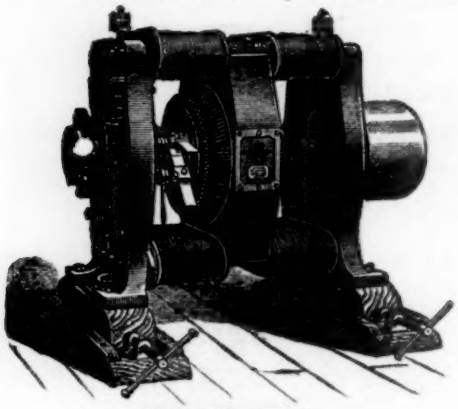

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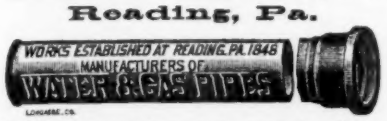

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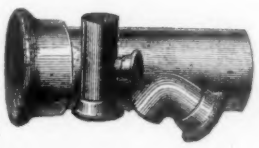

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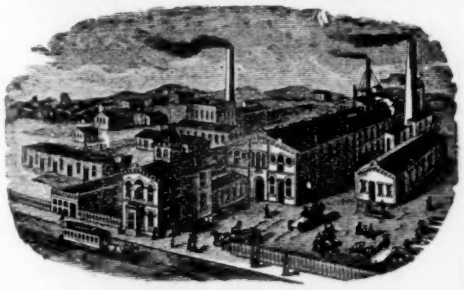

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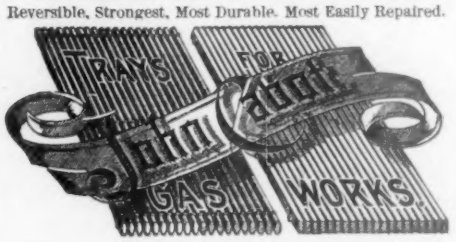

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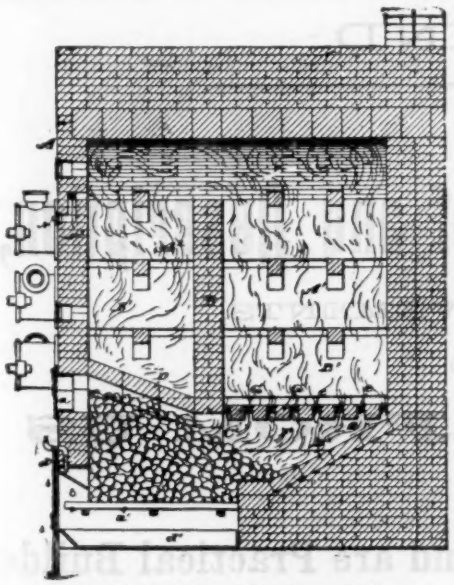

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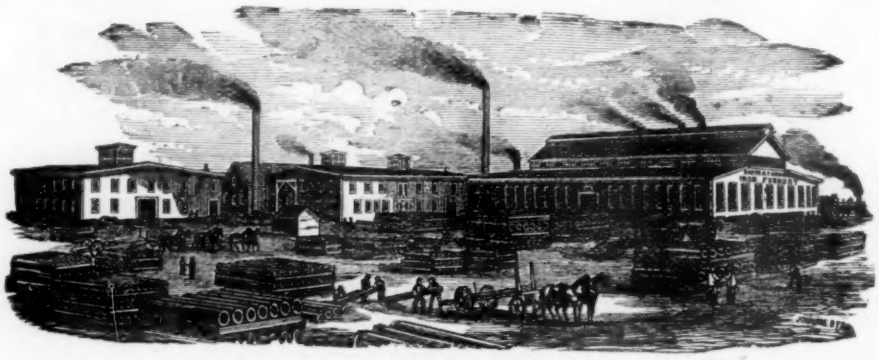

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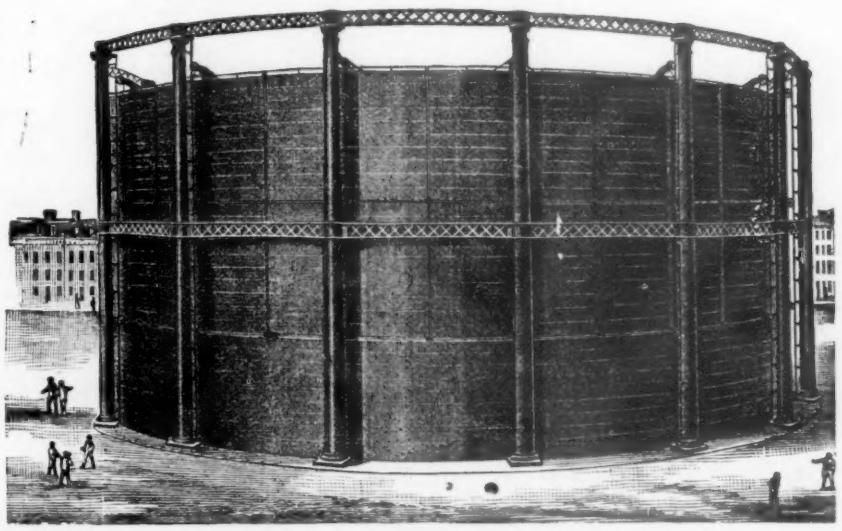

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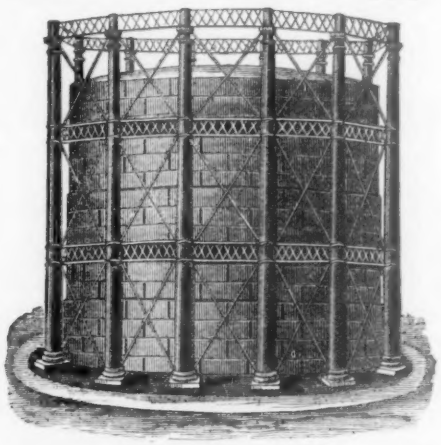

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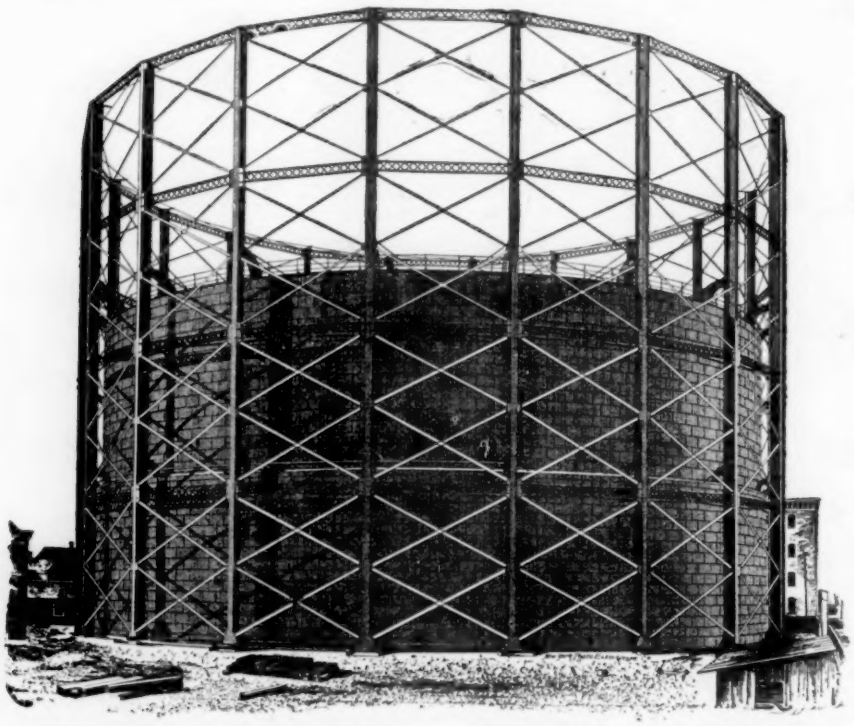

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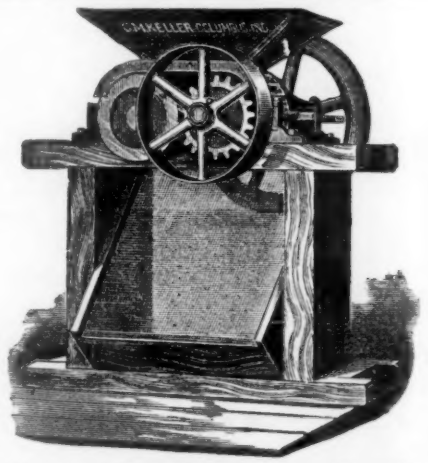

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